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<120> Genes from a Gene Cluster

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<150> JP 2000-116591

<151> 2000-04-18

<150> JP 2000-117458

<151> 2000-04-19

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 tggtaggatcg gttggtttcg gcgaggccga tggttatgtc tttgctgccg gtaagacgcg 780  
 ccaacaaaac gtggtaggcg gccaggtaga actgcatggg ggttgccctg tgcttgccgc 840  
 tccgtctttt gattcggaag gcgaccatgg gatctaaacg agcaattgct tcatactgct 900  
 gccacgtgaa tggctgtatt tgctgctgct ctgaattggc agcagggcca ttgatcagat 960  
 tcatgatggg aagcacgggt ggcgagatg acgagacttt gctatgcatg gacttccaga 1020  
 acgcgatatc gtccccatt cgccattttt ccaggttttc ccgtgtttgg acggctagat 1080  
 cagagaattg ggtcgatggt cgctgcattt tcaccccgct gtaaattctgc ccgatctcat 1140  
 tgaacagggt ttctgttggt gagccatcac caactaatct gtggtagccg attaccaaca 1200  
 ggtggtcacg tgtgccccag tagaaatcaa cgagtctgag agtgtcacct gtggagatgc 1260  
 tatagtttgt cttctcgagt ttccggtact cttcctctgc ctccgcagcg ttgttcacct 1320  
 gaacaaagtg cactctgttc tccgggttct tgagaaccac ttggacggga ccatttaaatt 1380  
 cgctgctata gtcacgcca gtaacaaagc acgtacggaa gatctcgtga cggcgcaatg 1440  
 aggccttcag agccgcctc aaccggtcga ggtcaatggt acccttcatg aacatgccaa 1500  
 tagtggtgtt gaagatggta tgat 1524

<210> 30  
 <211> 784  
 <212> DNA  
 <213> *Penicillium citrinum*

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 ctcagggcca ctgtaatggt atttcaggta tctctattta ctgctatcca gaagtcaggc 120  
 attaaatagt caggctcagc ccaggctcga ttcagattgg attcaggctt cagaccatgg 180  
 ccgctatgct ccttcgtact atacctccgt cgagctatac ccgcttgccc agacaaaagg 240  
 cttcactgaa ccttcaact taactgcatt tcgccacaac taactcgacg aggccggcga 300  
 tgggtgttacc attcatgagc tcaaagatcg acacatcaac atggatttca gatgtgatcc 360  
 agtttcgaag ttcaatggcg acgagtgagt ctacgccgac acctgccagg tttttggacg 420



aggacatgtc gtcttctgcc agaccaaaca ttccatcag cttttccgtc attgctttga 480  
 ggacgataga aatggcctcg tcgtgagagg tgaccctgct tagttgggcc cgcacgccat 540  
 ctggtccttt tttatgcgaa gagacaaagg attggtctgc atgaaggact tggcgggtatt 600  
 taagtcccac aaaccgctgt tcctgtatcc agtttgcttc ggtccagtga gcacccgggg 660  
 atgtgttgat tcctgtaacc acagctgcgg gaggtgatgg aaattgaggg gaagaacaca 720  
 ggattgcctt ctccaacaca tccatgacgt ctttttcag cataggcttg taacctattc 780  
 tagc 784

<210> 31  
 <211> 764  
 <212> DNA  
 <213> *Penicillium citrinum*

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 cgttttattt tactaaccta ctgcactaat acagcaccta gtttctctgg gacggaaacc 120  
 attggaataa gcctggggac ggatgcatat ttgttttagt ttgcgtgtta tatcttagca 180  
 ccggtcatga gggagcggga tgtcctcgtt gcgccggcgt accatgagct ttgtggttgg 240  
 atgcatacga acgctaaaag cgtgacggta gtatttgtca tcgtctcctg gtacaggctt 300  
 cacatcatac tgaatcagta tatgagcgag gagaatcttg atttccttcg aggcgaagaa 360  
 ccgcccgga caagcgcggtg ggttcacgcc gaagccgatg tgatcacctg tggattctc 420  
 caattgagcg gtgaaggcct tgtctggatc ctgcgcgatg cgcataaacc ggtagggatc 480  
 ataattttcg gggttttccc acacatcagg gttgttcatg cggctctgag ccacagcggc 540  
 caactcgccc ttgggaatga agaggccatt ggatagagtg atgtctctga gagcggtact 600  
 ggcgatagtg gcgcactcga ccggcttgat tcgctgcgtc tctttcatgc agctgtcgag 660  
 gagcttcagc ttgaacagag aggcaggcgt ccagccccct tctccgatta cagtgcggat 720  
 ctcttgccgg agaggctgaa taaggctctg gtgcctggca atgt 764

<210> 32  
 <211> 765  
 <212> DNA  
 <213> *Penicillium citrinum*

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 tctctttata tattcttctt cctactact tgcacgtaa atttcaacaa catataaaca 120  
 tgagataccc tttctggccg ttcactctac cacctgcctg tctcattgca ttgtgctttt 180  
 gaaaattatg acaataacaa ccaatgagaa aaaatatgat cctcctgcaa tgaatccact 240  
 ggagggggta cggagcttgg aatgctccta agattccgac ctaatcagcg tcgagcccga 300  
 tcagtagctg cagcactcgg cctcagtga ttgttaggaa cagggactgt cctggttccg 360  
 cctgacgggg agacacttcg agaaggggct gaagatgccg gggcagaacg gttgtgcgcc 420  
 atgtgcgcct tgaccaggtg accggcggct agggcagcac atagcgagag ctccccagcc 480

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<210> 33
<211> 802
<212> DNA
<213> Penicillium citrinum
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<210> 34
<211> 562
<212> DNA
<213> Penicillium citrinum
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		tccttgaggc	ctttgttgac	ttgggctctt	cgtctccggc	ttcgtcactc	caaagcacag	180
		ataggagacg	agaggccggc	gttatggttt	tatttttcagc	gccaaaggatt	tgccacgatg	240
		tgcttggcat	atctgatagg	actagacgaa	tagatgccgc	agccccgtgc	tcctgtgcta	300
		tccccaagc	agtctcaatc	ccactcaata	gtcgaaggct	tacacgcaat	gtcgtgcatg	360
		cagaagataa	ggcgtgcatg	aatgggtcga	gatgtgaaat	gagctcgccg	atatgaagat	420
		tagagtga	cgagggaagt	gcttcggctc	ttccattgtc	atttctagt	gttgagccag	480
		accagta	atccattcgt	gtgctttgct	tttgctccaca	aggttgggct	ttcatcacct	540

562

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<400> 35
gttaacatgt cagaacctct accccc
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26

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<400> 36
aatatttcaa gcatcagtct caggcac
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27

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<220>
<221> CDS
<222> (1) .. (1662)
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<400> 37  
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Met Ser Glu Pro Leu Pro Pro Lys Glu Gly Glu Pro Arg Pro Gln Lys  
1 5 10 15

gaa gaa agt caa aat gac acg ctc gaa gcg act gag tcc aag tcc cag 96  
Glu Glu Ser Gln Asn Asp Thr Leu Glu Ala Thr Glu Ser Lys Ser Gln  
20 25 30

cac atc aca ggc ctc aag ctg ggg ctg gtg gtt gct tca gtt act ttc  
His Ile Thr Gly Leu Lys Leu Gly Leu Val Val Ala Ser Val Thr Phe 144

35 40 45

gta gca ttt ttg atg ctc ctt gat atg tcc att atc gtc acg gca atc 192  
Val Ala Phe Leu Met Leu Leu Asp Met Ser Ile Ile Val Thr Ala Ile  
50 55 60

cca cat atc aca agc gag ttc cac tct ctg aac gat gta ggg tgg tac 240  
Pro His Ile Thr Ser Glu Phe His Ser Leu Asn Asp Val Gly Trp Tyr  
65 70 75 80

ggc agt gct tat ctt ctg gct aac tgt gct ctc cag ccc ctg gcc ggt 288  
Gly Ser Ala Tyr Leu Leu Ala Asn Cys Ala Leu Gln Pro Leu Ala Gly  
85 90 95

aaa ttg tat aca ctc ttg ggc ttg aag tac act ttc ttt gcc ttc ctc 336  
Lys Leu Tyr Thr Leu Leu Gly Leu Lys Tyr Thr Phe Phe Ala Phe Leu  
100 105 110

tgt	att	ttt	gaa	cta	ggc	tcg	gtg	cta	tgc	ggg	gcc	gca	aga	tct	tcc	384
Cys	Ile	Phe	Glu	Leu	Gly	Ser	Val	Leu	Cys	Gly	Ala	Ala	Arg	Ser	Ser	
		115					120					125				

acc atg ttg att gtt ggg cgg gcc gtt gct gga atg gga ggc tca ggt 432  
Thr Met Leu Ile Val Gly Arg Ala Val Ala Gly Met Gly Gly Ser Gly  
130 135 140

ctt gtc aac gga gcc ctc aca atc ctc tca aca gct gct cct aag cac 480  
Leu Val Asn Gly Ala Leu Thr Ile Leu Ser Thr Ala Ala Pro Lys His

145	150	155	160	
aag caa cca gtt ttg att gga gtg atg atg ggt ctt agt cag att gcc Lys Gln Pro Val Leu Ile Gly Val Met Met Gly Leu Ser Gln Ile Ala 165 170 175				528
att gtc tgt gga cca ctg ctc gga ggt gct ttc act caa cac gcc act Ile Val Cys Gly Pro Leu Leu Gly Gly Ala Phe Thr Gln His Ala Thr 180 185 190				576
tgg cga tgg tgc ttt tat atc aat ctc ccc atc ggc gct gtc gct gca Trp Arg Trp Cys Phe Tyr Ile Asn Leu Pro Ile Gly Ala Val Ala Ala 195 200 205				624
ttc ctc ctt ctc gtc atc acc ata ccc gac cga att tca tcc acg gac Phe Leu Leu Leu Val Ile Thr Ile Pro Asp Arg Ile Ser Ser Thr Asp 210 215 220				672
agc gaa ctc tcg acc gac aaa cca atg gcc aac ata aaa tcc aca ctt Ser Glu Leu Ser Thr Asp Lys Pro Met Ala Asn Ile Lys Ser Thr Leu 225 230 235 240				720
cgc aaa ctg gac ctt gta ggc ttt gtg gtc ttt gca gcc ttc gca acc Arg Lys Leu Asp Leu Val Gly Phe Val Phe Ala Ala Phe Ala Thr 245 250 255				768
atg att tcc ctc gca cta gaa tgg gga ggg tcg acc tac acc tgg cga Met Ile Ser Leu Ala Leu Glu Trp Gly Gly Ser Thr Tyr Thr Trp Arg 260 265 270				816
agt tcc gtc atc atc ggc ctg ttc tgt ggc gga ggg ttt gct ctg att Ser Ser Val Ile Ile Gly Leu Phe Cys Gly Gly Gly Phe Ala Leu Ile 275 280 285				864
gcg ttc gtg cta tgg gag cgt cat gtt ggc gat gct gtt gcc atg att Ala Phe Val Leu Trp Glu Arg His Val Gly Asp Ala Val Ala Met Ile 290 295 300				912
cct ggc tca gtg gct ggt aaa cga caa gtg tgg tgc tct tgt tta ttt Pro Gly Ser Val Ala Gly Lys Arg Gln Val Trp Cys Ser Cys Leu Phe 305 310 315 320				960
atg ggc ttt ttc tct ggc tcc ttg ctt gtc ttt tcc tac tat cta ccg Met Gly Phe Phe Ser Gly Ser Leu Leu Val Phe Ser Tyr Tyr Leu Pro 325 330 335				1008
atc tac ttc cag gct gtg aag gat gtt tct ccc aca ctg agt ggt gtg Ile Tyr Phe Gln Ala Val Lys Asp Val Ser Pro Thr Leu Ser Gly Val 340 345 350				1056
tac atg ttg cct gga att ctt gga caa gtc att atg gct atg gtt tct Tyr Met Leu Pro Gly Ile Leu Gly Gln Val Ile Met Ala Met Val Ser 355 360 365				1104
ggc ttc gca att gga aag aca gga tac tat ttg cct tgg gcc cta ggc Gly Phe Ala Ile Gly Lys Thr Gly Tyr Tyr Leu Pro Trp Ala Leu Gly 370 375 380				1152
agc gct gtt ctc gtc gcc ata ggc gca ggt ctg gta tcc acc ttc cag Ser Ala Val Leu Val Ala Ile Gly Ala Gly Leu Val Ser Thr Phe Gln 385 390 395 400				1200
ccc cat aca tca act gtg aaa tgg gtc atg tac caa ttt atc gcg ggc Pro His Thr Ser Thr Val Lys Trp Val Met Tyr Gln Phe Ile Ala Gly 405 410 415				1248
ttc ggt cgt ggt tgt ggc atg caa acg cct atc atc gcc atc caa agc Phe Gly Arg Gly Cys Gly Met Gln Thr Pro Ile Ile Ala Ile Gln Ser 420 425 430				1296

acg ctt tcg ccc gaa caa ggt gcc ctc gga att tct ctc gcc gtg ttt 1344  
 Thr Leu Ser Pro Glu Gln Gly Ala Leu Gly Ile Ser Leu Ala Val Phe  
 435 440 445

gga cag acg ttt gga gga tcg ctc ttc ctg gac ttt gct aac ctt gtc 1392  
 Gly Gln Thr Phe Gly Gly Ser Leu Phe Leu Asp Phe Ala Asn Leu Val  
 450 455 460

ttt ggg tcc ggt ttg aga act ggc ctg agc aag tat gcg ccc act gtc 1440  
 Phe Gly Ser Gly Leu Arg Thr Gly Leu Ser Lys Tyr Ala Pro Thr Val  
 465 470 475 480

gac acg cag gcc gtg acg gca gca ggg gcg act ggc ttc aga gat gtg 1488  
 Asp Thr Gln Ala Val Thr Ala Ala Gly Ala Thr Gly Phe Arg Asp Val  
 485 490 495

gtc agc aag aat aac ctt cca ggg gtt gta aaa gct tac agt ctc gcc 1536  
 Val Ser Lys Asn Asn Leu Pro Gly Val Val Lys Ala Tyr Ser Leu Ala  
 500 505 510

gtt gat cat act ttt tac tta gca gtg gga gct acg gcg tgc acg ttt 1584  
 Val Asp His Thr Phe Tyr Leu Ala Val Gly Ala Thr Ala Cys Thr Phe  
 515 520 525

gtg ttt gcc ttt gga atg gga tgg cgg aag att gca acc aaa aac gac 1632  
 Val Phe Ala Phe Gly Met Gly Trp Arg Lys Ile Ala Thr Lys Asn Asp  
 530 535 540

acc cgg gct gtg cct gag act gat gct tga 1662  
 Thr Arg Ala Val Pro Glu Thr Asp Ala  
 545 550

<210> 38  
 <211> 553  
 <212> PRT  
 <213> Penicillium citrinum

<400> 38

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Glu Glu Ser Gln Asn Asp Thr Leu Glu Ala Thr Glu Ser Lys Ser Gln  
 20 25 30

His Ile Thr Gly Leu Lys Leu Gly Leu Val Val Ala Ser Val Thr Phe  
 35 40 45

Val Ala Phe Leu Met Leu Leu Asp Met Ser Ile Ile Val Thr Ala Ile  
 50 55 60

Pro His Ile Thr Ser Glu Phe His Ser Leu Asn Asp Val Gly Trp Tyr  
 65 70 75 80

Gly Ser Ala Tyr Leu Leu Ala Asn Cys Ala Leu Gln Pro Leu Ala Gly  
 85 90 95

Lys Leu Tyr Thr Leu Leu Gly Leu Lys Tyr Thr Phe Phe Ala Phe Leu  
 100 105 110

Cys Ile Phe Glu Leu Gly Ser Val Leu Cys Gly Ala Ala Arg Ser Ser  
 115 120 125

Thr Met Leu Ile Val Gly Arg Ala Val Ala Gly Met Gly Gly Ser Gly  
130 135 140

Leu Val Asn Gly Ala Leu Thr Ile Leu Ser Thr Ala Ala Pro Lys His  
145 150 155 160

Lys Gln Pro Val Leu Ile Gly Val Met Met Gly Leu Ser Gln Ile Ala  
165 170 175

Ile Val Cys Gly Pro Leu Leu Gly Gly Ala Phe Thr Gln His Ala Thr  
180 185 190

Trp Arg Trp Cys Phe Tyr Ile Asn Leu Pro Ile Gly Ala Val Ala Ala  
195 200 205

Phe Leu Leu Leu Val Ile Thr Ile Pro Asp Arg Ile Ser Ser Thr Asp  
210 215 220

Ser Glu Leu Ser Thr Asp Lys Pro Met Ala Asn Ile Lys Ser Thr Leu  
225 230 235 240

Arg Lys Leu Asp Leu Val Gly Phe Val Val Phe Ala Ala Phe Ala Thr  
245 250 255

Met Ile Ser Leu Ala Leu Glu Trp Gly Gly Ser Thr Tyr Thr Trp Arg  
260 265 270

Ser Ser Val Ile Ile Gly Leu Phe Cys Gly Gly Gly Phe Ala Leu Ile  
275 280 285

Ala Phe Val Leu Trp Glu Arg His Val Gly Asp Ala Val Ala Met Ile  
290 295 300

Pro Gly Ser Val Ala Gly Lys Arg Gln Val Trp Cys Ser Cys Leu Phe  
305 310 315 320

Met Gly Phe Phe Ser Gly Ser Leu Leu Val Phe Ser Tyr Tyr Leu Pro  
325 330 335

Ile Tyr Phe Gln Ala Val Lys Asp Val Ser Pro Thr Leu Ser Gly Val  
340 345 350

Tyr Met Leu Pro Gly Ile Leu Gly Gln Val Ile Met Ala Met Val Ser  
355 360 365

Gly Phe Ala Ile Gly Lys Thr Gly Tyr Tyr Leu Pro Trp Ala Leu Gly  
370 375 380

Ser Ala Val Leu Val Ala Ile Gly Ala Gly Leu Val Ser Thr Phe Gln  
385 390 395 400

Pro His Thr Ser Thr Val Lys Trp Val Met Tyr Gln Phe Ile Ala Gly  
405 410 415

Phe Gly Arg Gly Cys Gly Met Gln Thr Pro Ile Ile Ala Ile Gln Ser  
420 425 430

Thr Leu Ser Pro Glu Gln Gly Ala Leu Gly Ile Ser Leu Ala Val Phe  
435 440 445

Gly Gln Thr Phe Gly Gly Ser Leu Phe Leu Asp Phe Ala Asn Leu Val  
450 455 460

Phe Gly Ser Gly Leu Arg Thr Gly Leu Ser Lys Tyr Ala Pro Thr Val  
465 470 475 480

Asp Thr Gln Ala Val Thr Ala Ala Gly Ala Thr Gly Phe Arg Asp Val  
485 490 495

Val Ser Lys Asn Asn Leu Pro Gly Val Val Lys Ala Tyr Ser Leu Ala  
500 505 510

Val Asp His Thr Phe Tyr Leu Ala Val Gly Ala Thr Ala Cys Thr Phe  
515 520 525

Val Phe Ala Phe Gly Met Gly Trp Arg Lys Ile Ala Thr Lys Asn Asp  
530 535 540

Thr Arg Ala Val Pro Glu Thr Asp Ala  
545 550

<210> 39  
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<213> Penicillium citrinum

<400> 39  
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<210> 40  
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<212> DNA  
<213> Penicillium citrinum

<400> 40  
ggatccctaa gcaatattgt gtttcttcgc 30

<210> 41  
<211> 1380  
<212> DNA  
<213> Penicillium citrinum

<220>  
<221> CDS  
<222> (1)..(1380)

<400> 41  
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Met Ser Leu Pro His Ala Thr Ile Pro Thr Asn Leu Arg Arg Arg Ala 48

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ggt agc aat gcc aat tta gtc cgt gct cag tgt caa cgt tgt caa caa Gly Ser Asn Ala Asn Leu Val Arg Ala Gln Cys Gln Arg Cys Gln Gln 35 40 45				144
gcc gga tta agg tgt gtg tac agc gaa agg cta ccc aag cgc aat tta Ala Gly Leu Arg Cys Val Tyr Ser Glu Arg Leu Pro Lys Arg Asn Leu 50 55 60				192
cat aaa gaa gcc gca gct gga act aca aga gcc aca gaa acc tca caa His Lys Glu Ala Ala Ala Gly Thr Thr Arg Ala Thr Glu Thr Ser Gln 65 70 75 80				240
cgc atg acc gcg aca tct tct acg gtc ttc tca tca ttg gca gag act Pro Met Thr Ala Thr Ser Ser Thr Val Phe Ser Ser Leu Ala Glu Thr 85 90 95				288
cct cca cct tac tgc tca cca cct acg cat att ggc acc tcg gca ctc Pro Pro Pro Tyr Cys Ser Pro Pro Thr His Ile Gly Thr Ser Ala Leu 100 105 110				336
aag gaa aca tta tca gaa cca tca gcg gca acc ctg caa ttc tat gat Lys Glu Thr Leu Ser Glu Pro Ser Ala Ala Thr Leu Gln Phe Tyr Asp 115 120 125				384
aca tca atc aac ttt gat gat ccc gag tcg ttt ccc ggc ggc tgg cct Thr Ser Ile Asn Phe Asp Asp Pro Glu Ser Phe Pro Gly Gly Trp Pro 130 135 140				432
cag cca aat aca ttt cgc gac gat gcc aac agc aat gaa tct tcg ggg Gln Pro Asn Thr Phe Arg Asp Asp Ala Asn Ser Asn Glu Ser Ser Gly 145 150 155 160				480
ata cca gat cta ggc tac gac ttt gaa ggc cct ttg gat gca acg gcg Ile Pro Asp Leu Gly Tyr Asp Phe Glu Gly Pro Leu Asp Ala Thr Ala 165 170 175				528
cct gtc tcg cca tcg ctg ttt gac ctc gaa gta gag ggg aac tcg tca Pro Val Ser Pro Ser Leu Phe Asp Leu Glu Val Glu Gly Asn Ser Ser 180 185 190				576
tcc gga caa tcc aac aca agc aac acg caa cga gac ctt ttc gaa agt Ser Gly Gln Ser Asn Thr Ser Asn Thr Gln Arg Asp Leu Phe Glu Ser 195 200 205				624
ctg tcg gat gtg tca cag gac cta gag gta ata ctc cac ggg gtg act Leu Ser Asp Val Ser Gln Asp Leu Glu Val Ile Leu His Gly Val Thr 210 215 220				672
gtg gaa tgg ccc aag caa aaa att tta agc tac ccg ata ggg gac ttt Val Glu Trp Pro Lys Gln Lys Ile Leu Ser Tyr Pro Ile Gly Asp Phe 225 230 235 240				720
ttg aat gcc ttt ggt aga ttg cta cta cat ctt caa gaa cgt gtg atc Leu Asn Ala Phe Gly Arg Leu Leu Leu His Leu Gln Glu Arg Val Ile 245 250 255				768
acg agc agc aat agc agc atg tta gat ggg tgt ctg caa acc aag aac Thr Ser Ser Asn Ser Ser Met Leu Asp Gly Cys Leu Gln Thr Lys Asn 260 265 270				816
ttg ttc atg gcg gtg cat tgc tac atg ttg tct gtc aaa atc atg aca Leu Phe Met Ala Val His Cys Tyr Met Leu Ser Val Lys Ile Met Thr 275 280 285				864

1000-500000



His Lys Glu Ala Ala Ala Gly Thr Thr Arg Ala Thr Glu Thr Ser Gln  
65 70 75 80

Pro Met Thr Ala Thr Ser Ser Thr Val Phe Ser Ser Leu Ala Glu Thr  
85 90 95

Pro Pro Pro Tyr Cys Ser Pro Pro Thr His Ile Gly Thr Ser Ala Leu  
100 105 110

Lys Glu Thr Leu Ser Glu Pro Ser Ala Ala Thr Leu Gln Phe Tyr Asp  
115 120 125

Thr Ser Ile Asn Phe Asp Asp Pro Glu Ser Phe Pro Gly Gly Trp Pro  
130 135 140

Gln Pro Asn Thr Phe Arg Asp Asp Ala Asn Ser Asn Glu Ser Ser Gly  
145 150 155 160

Ile Pro Asp Leu Gly Tyr Asp Phe Glu Gly Pro Leu Asp Ala Thr Ala  
165 170 175

Pro Val Ser Pro Ser Leu Phe Asp Leu Glu Val Glu Gly Asn Ser Ser  
180 185 190

Ser Gly Gln Ser Asn Thr Ser Asn Thr Gln Arg Asp Leu Phe Glu Ser  
195 200 205

Leu Ser Asp Val Ser Gln Asp Leu Glu Val Ile Leu His Gly Val Thr  
210 215 220

Val Glu Trp Pro Lys Gln Lys Ile Leu Ser Tyr Pro Ile Gly Asp Phe  
225 230 235 240

Leu Asn Ala Phe Gly Arg Leu Leu Leu His Leu Gln Glu Arg Val Ile  
245 250 255

Thr Ser Ser Asn Ser Ser Met Leu Asp Gly Cys Leu Gln Thr Lys Asn  
260 265 270

Leu Phe Met Ala Val His Cys Tyr Met Leu Ser Val Lys Ile Met Thr  
275 280 285

Ser Leu Ser Gln Leu Leu Leu Ser Glu Val Met Lys Ala Gln Pro Cys  
290 295 300

Gly Gln Lys Gln Ser Thr Arg Met Asp Trp Tyr Trp Ser Gly Ser Thr  
305 310 315 320

Thr Arg Asn Asp Asn Gly Arg Ala Glu Ala Leu Pro Ser Phe His Ser  
325 330 335

Asn Leu His Ile Gly Glu Leu Ile Ser His Leu Asp Pro Phe Met His  
340 345 350

102410-50498850

Ala Leu Ser Ser Ala Cys Thr Thr Leu Arg Val Ser Leu Arg Leu Leu  
355 360 365

Ser Glu Ile Glu Thr Ala Leu Gly Ile Ala Gln Glu His Gly Ala Ala  
370 375 380

Ala Ser Ile Arg Leu Val Leu Ser Asp Met Pro Ser Thr Ser Trp Gln  
385 390 395 400

Ile Leu Gly Ala Glu Asn Lys Thr Ile Thr Pro Ala Ser Arg Leu Leu  
405 410 415

Ser Val Leu Trp Ser Asp Glu Ala Gly Asp Glu Glu Pro Lys Ser Thr  
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Lys Ala Ser Gly Lys Thr Ile Asn Val Leu Arg Arg Cys Tyr Lys Glu  
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Ile Phe Ala Leu Ala Lys Lys His Asn Ile Ala  
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<211> 9099  
<212> DNA  
<213> Penicillium citrinum

<220>  
<221> CDS  
<222> (1)..(9099)

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ggg tgt cgg ttt cca ggt ggt gtc aac aca cca tca aaa ctt tgg gag 96  
Gly Cys Arg Phe Pro Gly Gly Val Asn Thr Pro Ser Lys Leu Trp Glu  
20 25 30  
ctg ctc aaa gag ccc cgg gat gta cag acc aag atc cct aag gag aga 144  
Leu Leu Lys Glu Pro Arg Asp Val Gln Thr Lys Ile Pro Lys Glu Arg  
35 40 45  
ttt gac gtc gat aca ttt tac agc ccc gat ggc act cac ccc ggg cgc 192  
Phe Asp Val Asp Thr Phe Tyr Ser Pro Asp Gly Thr His Pro Gly Arg  
50 55 60  
acg aac gca ccc ttt gca tac ttg ctg cag gag gat cta cgc ggt ttt 240  
Thr Asn Ala Pro Phe Ala Tyr Leu Leu Gln Glu Asp Leu Arg Gly Phe  
65 70 75 80  
gat gcc tct ttc ttc aac atc caa gct gga gag gcc gaa acg att gac 288  
Asp Ala Ser Phe Phe Asn Ile Gln Ala Gly Glu Ala Glu Thr Ile Asp  
85 90 95  
cca cag caa agg ctg ctg ctg gag acg gtc tat gaa gct gta tcc aac 336  
Pro Gln Gln Arg Leu Leu Leu Glu Thr Val Tyr Glu Ala Val Ser Asn  
100 105 110  
gca ggc cta cgg atc caa ggc ctt caa gga tcc tct act gct gtg tac 384  
Ala Gly Leu Arg Ile Gln Gly Leu Gln Gly Ser Ser Thr Ala Val Tyr  
115 120 125

gtc ggt atg atg acg cat gac tat gag act atc gtg acg cgt gaa ttg Val Gly Met Met Thr His Asp Tyr Glu Thr Ile Val Thr Arg Glu Leu 130 135 140	432
gat agt att cct aca tac tct gcc acg ggg gta gct gtc agt gtg gcc Asp Ser Ile Pro Thr Tyr Ser Ala Thr Gly Val Ala Val Ser Val Ala 145 150 155 160	480
tcc aac cgt gta tca tac ttc ttc gac tgg cat ggg ccg agt atg acg Ser Asn Arg Val Ser Tyr Phe Phe Asp Trp His Gly Pro Ser Met Thr 165 170 175	528
atc gac aca gcc tgt agt tca tcc tta gct gcc gtg cat ctg gcc gtc Ile Asp Thr Ala Cys Ser Ser Ser Leu Ala Ala Val His Leu Ala Val 180 185 190	576
caa cag ctt aga acg ggc gag agt acc atg gcg gtt gca gcc ggt gcg Gln Gln Leu Arg Thr Gly Glu Ser Thr Met Ala Val Ala Ala Gly Ala 195 200 205	624
aat ctg ata ttg ggc ccc atg acc ttt gta atg gag agc aaa ttg aac Asn Leu Ile Leu Gly Pro Met Thr Phe Val Met Glu Ser Lys Leu Asn 210 215 220	672
atg ctg tcc ccc aat ggt aga tct cga atg tgg gat gct gct gcc gat Met Leu Ser Pro Asn Gly Arg Ser Arg Met Trp Asp Ala Ala Ala Asp 225 230 235 240	720
gga tat gcc aga gga gaa ggt gtt tgc tct att gtc ctg aaa acg ctg Gly Tyr Ala Arg Gly Glu Gly Val Cys Ser Ile Val Leu Lys Thr Leu 245 250 255	768
agc cag gca ctg cgc gac ggg gac agt atc gag tgt gtt atc cga gag Ser Gln Ala Leu Arg Asp Gly Asp Ser Ile Glu Cys Val Ile Arg Glu 260 265 270	816
acc ggt atc aac caa gat ggc cga acg aca ggt atc aca atg cca aac Thr Gly Ile Asn Gln Asp Gly Arg Thr Thr Gly Ile Thr Met Pro Asn 275 280 285	864
cat agc gca caa gaa gcc ctc att cgg gcc aca tat gcc aag gct ggt His Ser Ala Gln Glu Ala Leu Ile Arg Ala Thr Tyr Ala Lys Ala Gly 290 295 300	912
ctt gat att acc aac ccc cag gaa cgc tgc cag ttc ttt gaa gcc cat Leu Asp Ile Thr Asn Pro Gln Glu Arg Cys Gln Phe Phe Glu Ala His 305 310 315 320	960
gga act ggt aca cca gcc ggt gac cca cag gaa gct gag gct att gca Gly Thr Gly Thr Pro Ala Gly Asp Pro Gln Glu Ala Glu Ala Ile Ala 325 330 335	1008
aca gcc ttc ttc gga cac aag gat gga aca atc gac agc gac ggc gag Thr Ala Phe Phe Gly His Lys Asp Gly Thr Ile Asp Ser Asp Gly Glu 340 345 350	1056
aaa gat gag ctt ttt gtc ggc agc atc aag aca gtt ctc ggt cac acg Lys Asp Glu Leu Phe Val Gly Ser Ile Lys Thr Val Leu Gly His Thr 355 360 365	1104
gaa ggc act gct ggt att gcg ggc tta atg aag gca tcg ttt gct gta Glu Gly Thr Ala Gly Ile Ala Gly Leu Met Lys Ala Ser Phe Ala Val 370 375 380	1152
cga aat ggc gtg atc ccg cca aac ctg ctg ttt gag aag atc agt ccc Arg Asn Gly Val Ile Pro Pro Asn Leu Leu Phe Glu Lys Ile Ser Pro 385 390 395 400	1200
cgt gtc gct ccg ttc tat acg cac ttg aaa att gca acg gag gcc aca Arg Val Ala Pro Phe Tyr Thr His Leu Lys Ile Ala Thr Glu Ala Thr 1248	

405							410							415							
gaa	tgg	ccg	att	gtt	gcg	ccc	ggg	cag	cct	cgc	aga	gtc	agc	gtt	aat	1296					
Glu	Trp	Pro	Ile	Val	Ala	Pro	Gly	Gln	Pro	Arg	Arg	Val	Ser	Val	Asn						
			420					425					430								
tca	ttt	gga	ttt	ggt	ggt	aca	aat	gcc	cat	gct	att	atc	gaa	gag	tat	1344					
Ser	Phe	Gly	Phe	Gly	Gly	Thr	Asn	Ala	His	Ala	Ile	Ile	Glu	Glu	Tyr						
		435					440					445									
atg	gct	cct	cca	cac	aag	ccg	aca	gca	gtg	gta	aca	gag	gtg	acc	tca	1392					
Met	Ala	Pro	Pro	His	Lys	Pro	Thr	Ala	Val	Val	Thr	Glu	Val	Thr	Ser						
	450					455					460										
gat	gca	gat	gca	tgc	agc	ttg	ccc	ctt	gtg	ctt	tca	tcg	aag	tcg	cag	1440					
Asp	Ala	Asp	Ala	Cys	Ser	Leu	Pro	Leu	Val	Leu	Ser	Ser	Lys	Ser	Gln						
465					470					475					480						
cgc	tcc	atg	aag	gca	acg	cta	gaa	aat	atg	ctc	caa	ttt	ctg	gaa	acg	1488					
Arg	Ser	Met	Lys	Ala	Thr	Leu	Glu	Asn	Met	Leu	Gln	Phe	Leu	Glu	Thr						
				485					490					495							
cat	gat	gac	gtg	gac	atg	cat	gat	atc	gca	tat	acc	tta	ctt	gag	aaa	1536					
His	Asp	Asp	Val	Asp	Met	His	Asp	Ile	Ala	Tyr	Thr	Leu	Leu	Glu	Lys						
			500					505					510								
cgg	tct	atc	ttg	ccc	ttc	cgt	cgt	gcg	att	gca	gca	cac	aac	aag	gaa	1584					
Arg	Ser	Ile	Leu	Pro	Phe	Arg	Arg	Ala	Ile	Ala	Ala	His	Asn	Lys	Glu						
		515					520					525									
gta	gcc	cgc	gcg	gca	ctg	gag	gct	gcc	atc	gcg	gac	ggg	gag	gtc	gtc	1632					
Val	Ala	Arg	Ala	Ala	Leu	Glu	Ala	Ala	Ile	Ala	Asp	Gly	Glu	Val	Val						
	530					535					540										
acc	gac	ttc	cgc	acc	gac	gcg	aat	gac	aac	cct	cgc	gta	cta	ggg	gtc	1680					
Thr	Asp	Phe	Arg	Thr	Asp	Ala	Asn	Asp	Asn	Pro	Arg	Val	Leu	Gly	Val						
545					550					555					560						
ttt	act	ggc	caa	ggg	gca	cag	tgg	ccg	ggc	atg	ctg	aag	aag	ctc	atg	1728					
Phe	Thr	Gly	Gln	Gly	Ala	Gln	Trp	Pro	Gly	Met	Leu	Lys	Lys	Leu	Met						
				565					570					575							
gtg	ggg	atg	cca	ttt	gtg	aga	ggc	att	ctc	gaa	gag	ctg	gat	aat	tca	1776					
Val	Gly	Met	Pro	Phe	Val	Arg	Gly	Ile	Leu	Glu	Glu	Leu	Asp	Asn	Ser						
			580					585					590								
ctg	caa	aca	ctg	cct	gaa	aag	tat	cgg	cct	acg	tgg	aca	ctg	tat	gac	1824					
Leu	Gln	Thr	Leu	Pro	Glu	Lys	Tyr	Arg	Pro	Thr	Trp	Thr	Leu	Tyr	Asp						
		595					600					605									
cag	ctc	atg	ctt	gaa	ggg	gat	gcc	tca	aac	gtc	aga	ctc	gcc	agc	ttc	1872					
Gln	Leu	Met	Leu	Glu	Gly	Asp	Ala	Ser	Asn	Val	Arg	Leu	Ala	Ser	Phe						
	610					615					620										
tcc	cag	cct	cta	tgc	tgc	gcc	gta	caa	atc	gtt	ctg	gtc	cga	ctt	ctc	1920					
Ser	Gln	Pro	Leu	Cys	Cys	Ala	Val	Gln	Ile	Val	Leu	Val	Arg	Leu	Leu						
625					630					635					640						
gct	gca	gct	ggg	atc	gag	ttc	agt	gca	att	gtc	ggc	cac	agt	tca	ggg	1968					
Ala	Ala	Ala	Gly	Ile	Glu	Phe	Ser	Ala	Ile	Val	Gly	His	Ser	Ser	Gly						
				645					650					655							
gag	att	gcc	tgt	gcc	ttt	gcg	gca	gga	ttc	atc	agt	gcc	act	caa	gct	2016					
Glu	Ile	Ala	Cys	Ala	Phe	Ala	Ala	Gly	Phe	Ile	Ser	Ala	Thr	Gln	Ala						
			660					665					670								
atc	cgt	att	gcg	cat	ctg	cgt	gga	gtt	gtg	tcc	gcg	gag	cat	gcc	tct	2064					
Ile	Arg	Ile	Ala	His	Leu	Arg	Gly	Val	Val	Ser	Ala	Glu	His	Ala	Ser						
		675					680					685									

tct cca agc ggc cag aca ggc gct atg cta gcg gca ggt atg tcg tac	2112
Ser Pro Ser Gly Gln Thr Gly Ala Met Leu Ala Ala Gly Met Ser Tyr	
690 695 700	
gat gac gca aag gaa cta tgc gag ctc gaa gcc ttt gag ggt cgg gtc	2160
Asp Asp Ala Lys Glu Leu Cys Glu Leu Glu Ala Phe Glu Gly Arg Val	
705 710 715 720	
tgc gtc gcc gct agc aat tca ccg gat agt gtg acc ttc tcc ggc gac	2208
Cys Val Ala Ala Ser Asn Ser Pro Asp Ser Val Thr Phe Ser Gly Asp	
725 730 735	
atg gat gct atc cag cac gtt gaa ggt gtc ttg gag gat gaa tcc act	2256
Met Asp Ala Ile Gln His Val Glu Gly Val Leu Glu Asp Glu Ser Thr	
740 745 750	
ttt gcc aga atc ttg aga gtt gac aag gcc tac cat tcg cat cac atg	2304
Phe Ala Arg Ile Leu Arg Val Asp Lys Ala Tyr His Ser His His Met	
755 760 765	
cac cca tgc gca gct cca tat gtc aag gca ttg ctg gag tgc gac tgt	2352
His Pro Cys Ala Ala Pro Tyr Val Lys Ala Leu Leu Glu Cys Asp Cys	
770 775 780	
gct gtt gcc gat ggc caa ggt aac gat agt gtt gct tgg ttc tct gcc	2400
Ala Val Ala Asp Gly Gln Gly Asn Asp Ser Val Ala Trp Phe Ser Ala	
785 790 795 800	
gtc cac gag acc agc aag caa atg act gta cag gat gtg atg ccc gct	2448
Val His Glu Thr Ser Lys Gln Met Thr Val Gln Asp Val Met Pro Ala	
805 810 815	
tat tgg aaa gac aat ctc gtc tct ccg gtc ttg ttc tcg cag gct gtg	2496
Tyr Trp Lys Asp Asn Leu Val Ser Pro Val Leu Phe Ser Gln Ala Val	
820 825 830	
cag aaa gca gtc atc act cat cgt cta atc gac gtc gcc atc gaa att	2544
Gln Lys Ala Val Ile Thr His Arg Leu Ile Asp Val Ala Ile Glu Ile	
835 840 845	
ggc gcc cac cct gct ctc aag ggt ccg tgt cta gcc acc atc aag gat	2592
Gly Ala His Pro Ala Leu Lys Gly Pro Cys Leu Ala Thr Ile Lys Asp	
850 855 860	
gct ctt gcc ggt gtg gag ctg ccg tat acc ggg tgc ttg gca cga aac	2640
Ala Leu Ala Gly Val Glu Leu Pro Tyr Thr Gly Cys Leu Ala Arg Asn	
865 870 875 880	
gtt gac gat gtg gac gct ttt gct gga ggt ctg gga tac att tgg gag	2688
Val Asp Asp Val Asp Ala Phe Ala Gly Gly Leu Gly Tyr Ile Trp Glu	
885 890 895	
cgt ttc gga gtt cgg agt atc gac gcc gag ggc ttc gta caa caa gtc	2736
Arg Phe Gly Val Arg Ser Ile Asp Ala Glu Gly Phe Val Gln Gln Val	
900 905 910	
cgg ccc gat cgt gcc gtt caa aac ctg tca aag tca ttg ccc aca tac	2784
Arg Pro Asp Arg Ala Val Gln Asn Leu Ser Lys Ser Leu Pro Thr Tyr	
915 920 925	
tct tgg gat cat act cgt caa tac tgg gca gaa tct cgc tcc acc cgc	2832
Ser Trp Asp His Thr Arg Gln Tyr Trp Ala Glu Ser Arg Ser Thr Arg	
930 935 940	
cag cat ctt cgt gga ggt gcg ccc cat ctt ctg ctt gga aag ctt tct	2880
Gln His Leu Arg Gly Glu Ala Pro His Leu Leu Gly Lys Leu Ser	
945 950 955 960	
tct tac agc aca gca tcg acc ttc cag tgg aca aac ttc atc agg ccc	2928
Ser Tyr Ser Thr Ala Ser Thr Phe Gln Trp Thr Asn Phe Ile Arg Pro	

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965	970	975	
cgg gat ctg gaa tgg ctc gac ggt cat gcg cta caa ggc cag act gtg Arg Asp Leu Glu Trp Leu Asp Gly His Ala Leu Gln Gly Gln Thr Val 980 985 990			2976
ttc ccc gct gct ggg tac ata att atg gcc atg gaa gct gcc atg aag Phe Pro Ala Ala Gly Tyr Ile Ile Met Ala Met Glu Ala Ala Met Lys 995 1000 1005			3024
gtg gct ggt gag cgt gcc gcc caa gtt cag ctc ctg gaa atc ttg Val Ala Gly Glu Arg Ala Ala Gln Val Gln Leu Leu Glu Ile Leu 1010 1015 1020			3069
gac atg agc atc aac aaa gcc atc gtg ttt gaa gat gaa aac acc Asp Met Ser Ile Asn Lys Ala Ile Val Phe Glu Asp Glu Asn Thr 1025 1030 1035			3114
tcc gtg gag ctg aac ttg aca gcc gaa gtc acc agt gac aat gat Ser Val Glu Leu Asn Leu Thr Ala Glu Val Thr Ser Asp Asn Asp 1040 1045 1050			3159
gcg gat ggc caa gtc acg gtc aaa ttt gtt att gat tcc tgt ctg Ala Asp Gly Gln Val Thr Val Lys Phe Val Ile Asp Ser Cys Leu 1055 1060 1065			3204
gca aag gag agt gag ctt tcg aca tcc gcc aaa ggc caa atc gtc Ala Lys Glu Ser Glu Leu Ser Thr Ser Ala Lys Gly Gln Ile Val 1070 1075 1080			3249
ata acc ctt ggc gag gca tca ccg tca tcg cag ctt ttg ccg cca Ile Thr Leu Gly Glu Ala Ser Pro Ser Ser Gln Leu Leu Pro Pro 1085 1090 1095			3294
cct gag gaa gag tac ccc cag atg aac aat gtc aac atc gat ttc Pro Glu Glu Glu Tyr Pro Gln Met Asn Asn Val Asn Ile Asp Phe 1100 1105 1110			3339
ttc tat cgg gaa ctt gac ctc ctt ggg tat gac tac agc aaa gac Phe Tyr Arg Glu Leu Asp Leu Leu Gly Tyr Asp Tyr Ser Lys Asp 1115 1120 1125			3384
ttc cgt cgt ttg cag acc atg aga agg gcc gac tcc aaa gct agc Phe Arg Arg Leu Gln Thr Met Arg Arg Ala Asp Ser Lys Ala Ser 1130 1135 1140			3429
ggc acc ttg gct ttc ctt cca ctt aag gat gaa ttg cgc aat gag Gly Thr Leu Ala Phe Leu Pro Leu Lys Asp Glu Leu Arg Asn Glu 1145 1150 1155			3474
ccc ctc ttg ctc cac cca gcg ccc ctg gac atc gcg ttc cag act Pro Leu Leu Leu His Pro Ala Pro Leu Asp Ile Ala Phe Gln Thr 1160 1165 1170			3519
gtc att gga gcg tat tcc tct cca gga gat cgt cgc cta cgc tca Val Ile Gly Ala Tyr Ser Ser Pro Gly Asp Arg Arg Leu Arg Ser 1175 1180 1185			3564
ttg tac gtg cct act cac gtt gac aga gtg act ctg att cca tcg Leu Tyr Val Pro Thr His Val Asp Arg Val Thr Leu Ile Pro Ser 1190 1195 1200			3609
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gac aca atc aac aca cac gac aag ggt gat ttc ctg agc ggc gac Asp Thr Ile Asn Thr His Asp Lys Gly Asp Phe Leu Ser Gly Asp 1220 1225 1230			3699

atc acg Ile Thr 1235	gtg tac gat tcg acc Val Tyr Asp Ser Thr 1240	aag aca acg ctt ttc Lys Thr Thr Leu Phe 1245	caa gtt gat Gln Val Asp 3744
aac att Asn Ile 1250	gtc ttt aag cct ttc Val Phe Lys Pro Phe 1255	tct ccc ccg act gct Ser Pro Pro Thr Ala 1260	tcg acc gac Ser Thr Asp 3789
cac cga His Arg 1265	atc ttc gca aag tgg Ile Phe Ala Lys Trp 1270	gtc tgg gga ccc ctc Val Trp Gly Pro Leu 1275	acg ccc gaa Thr Pro Glu 3834
aaa ctg Lys Leu 1280	ctg gag gac cct gcg Leu Glu Asp Pro Ala 1285	acg ttg atc ata gct Thr Leu Ile Ile Ala 1290	cgg gac aag Arg Asp Lys 3879
gag gac Glu Asp 1295	att ctg acc atc gag Ile Leu Thr Ile Glu 1300	cga atc gtt tac ttc Arg Ile Val Tyr Phe 1305	tac atc aaa Tyr Ile Lys 3924
tcc ttc Ser Phe 1310	cta gcc cag ata acc Leu Ala Gln Ile Thr 1315	ccc gac gac cgt caa Pro Asp Asp Arg Gln 1320	aat gcc gac Asn Ala Asp 3969
ctc cat Leu His 1325	tcc cag aag tac att Ser Gln Lys Tyr Ile 1330	gaa tgg tgt gac cag Glu Trp Cys Asp Gln 1335	gtt cag gcc Val Gln Ala 4014
gat gct Asp Ala 1340	cgg gct ggc cac cat Arg Ala Gly His His 1345	cag tgg tac cag gag Gln Trp Tyr Gln Glu 1350	tct tgg gag Ser Trp Glu 4059
gag gac Glu Asp 1355	act tct gtt cac att Thr Ser Val His Ile 1360	gag caa atg tgt gaa Glu Gln Met Cys Glu 1365	agc aac tcg Ser Asn Ser 4104
tcc cac Ser His 1370	cca cat gtg cgc ctg Pro His Val Arg Leu 1375	atc caa agg gta ggc Ile Gln Arg Val Gly 1380	aaa gaa tta Lys Glu Leu 4149
att tca Ile Ser 1385	att gtt cgc ggg aac Ile Val Arg Gly Asn 1390	ggg gat cct ttg gat Gly Asp Pro Leu Asp 1395	atc atg aac Ile Met Asn 4194
cgc gat Arg Asp 1400	ggg ttg ttc acc gag Gly Leu Phe Thr Glu 1405	tac tat acc aac aag Tyr Tyr Thr Asn Lys 1410	ctc gcc ttt Leu Ala Phe 4239
ggc tca Gly Ser 1415	gca ata cac gtc gtt Ala Ile His Val Val 1420	cag gat ctg gtt agc Gln Asp Leu Val Ser 1425	caa att gct Gln Ile Ala 4284
cat cgc His Arg 1430	tac caa tcc att gat Tyr Gln Ser Ile Asp 1435	atc ctt gag atc ggc Ile Leu Glu Ile Gly 1440	ttg ggt aca Leu Gly Thr 4329
ggc atc Gly Ile 1445	gcc acg aag cgc gtt Ala Thr Lys Arg Val 1450	ctt gca tca cct caa Leu Ala Ser Pro Gln 1455	ctt ggt ttc Leu Gly Phe 4374
aac agt Asn Ser 1460	tac act tgc act gac Tyr Thr Cys Thr Asp 1465	atc tcg gcg gat gtt Ile Ser Ala Asp Val 1470	att ggc aag Ile Gly Lys 4419
gcc cgt Ala Arg 1475	gaa caa ctt tcc gaa Glu Gln Leu Ser Glu 1480	ttc gac ggt ctc atg Phe Asp Gly Leu Met 1485	cag ttt gag Gln Phe Glu 4464
gca cta Ala Leu	gac atc aac aga agc Asp Ile Asn Arg Ser	cca gca gag caa gga Pro Ala Glu Gln Gly	ttc aag cct Phe Lys Pro 4509



1490	1495	1500	
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cgc ggt ggt cac ttg gtt act ttc ggg gtc acc cat cgc gag cct Pro Gly Gly His Leu Val Thr Phe Gly Val Thr His Arg Glu Pro 1535 1540 1545			4644
gct cgc ctc gcc ttc atc tct ggg ctt ttc gct gat cga tgg act Ala Arg Leu Ala Phe Ile Ser Gly Leu Phe Ala Asp Arg Trp Thr 1550 1555 1560			4689
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agt cgg aca ctt gat cga gag gat gat ttg atc ccg tct gtc ttc Ser Arg Thr Leu Asp Arg Glu Asp Asp Leu Ile Pro Ser Val Phe 1595 1600 1605			4824
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ggt ggc gaa tcg aca aaa acc gaa cgc att ttg aac gac atg aaa Gly Gly Glu Ser Thr Lys Thr Glu Arg Ile Leu Asn Asp Met Lys 1640 1645 1650			4959
gct gcc cta ccg cat aga cac atc cac tcc gtc aag cgg ctg gaa Ala Ala Leu Pro His Arg His Ile His Ser Val Lys Arg Leu Glu 1655 1660 1665			5004
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gac aag ttt gag gca gtc aag tct ctt ctc ttc tac gcc gga cgc Asp Lys Phe Glu Ala Val Lys Ser Leu Leu Phe Tyr Ala Gly Arg 1700 1705 1710			5139
atg atg tgg ctg aca gag aat gcc tgg att gat cat ccc cac cag Met Met Trp Leu Thr Glu Asn Ala Trp Ile Asp His Pro His Gln 1715 1720 1725			5184
gcc agc acc atc gga atg ttg agg aca atc aag ctc gag aac cct Ala Ser Thr Ile Gly Met Leu Arg Thr Ile Lys Leu Glu Asn Pro 1730 1735 1740			5229
gac ttg gga acg cac gtc ttc gat gtc gat act gtg gag aac cta Asp Leu Gly Thr His Val Phe Asp Val Asp Thr Val Glu Asn Leu 1745 1750 1755			5274

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gac Asp	acc Thr 1760	aaa Lys	ttc Phe	ttc Phe	gtt Val	gag Glu 1765	caa Gln	ctt Leu	ttg Leu	cgc Arg	ttc Phe 1770	gag Glu	gag Glu	agc Ser	5319
gat Asp	gat Asp 1775	cag Gln	ctt Leu	ttg Leu	gaa Glu	tca Ser 1780	ata Ile	aca Thr	tgg Trp	act Thr	cat His 1785	gag Glu	ccc Pro	gaa Glu	5364
gtg Val	tac Tyr 1790	tgg Trp	tgc Cys	aag Lys	ggg Gly	cgt Arg 1795	gcc Ala	tgg Trp	gtc Val	cct Pro	cgt Arg 1800	ttg Leu	aag Lys	cag Gln	5409
gat Asp	att Ile 1805	gct Ala	agg Arg	aac Asn	gac Asp	cgt Arg 1810	atg Met	aac Asn	tcg Ser	tct Ser	cgt Arg 1815	cgt Arg	cca Pro	att Ile	5454
ttc Phe	ggg Gly 1820	aac Asn	ttt Phe	aat Asn	tcg Ser	tcc Ser 1825	aag Lys	acg Thr	gcc Ala	att Ile	gca Ala 1830	ctg Leu	aaa Lys	gag Glu	5499
gcg Ala	agg Arg 1835	gga Gly	gca Ala	tcc Ser	tca Ser	tcg Ser 1840	atg Met	tac Tyr	tat Tyr	ctt Leu	gag Glu 1845	tca Ser	acc Thr	gag Glu	5544
acg Thr	tgt Cys 1850	gat Asp	tcg Ser	tta Leu	gaa Glu	gac Asp 1855	gct Ala	cgt Arg	cat His	gct Ala	gga Gly 1860	aaa Lys	gca Ala	act Thr	5589
gtt Val	cgt Arg 1865	gtt Val	cgc Arg	tac Tyr	gct Ala	ctt Leu 1870	ccc Pro	cag Gln	gca Ala	att Ile	cgc Arg 1875	gtg Val	ggc Gly	cat His	5634
ctc Leu	gga Gly 1880	tac Tyr	ttc Phe	cat His	gtc Val	gtg Val 1885	cag Gln	ggc Gly	agt Ser	att Ile	ctg Leu 1890	gag Glu	aat Asn	aca Thr	5679
tgt Cys	gag Glu 1895	gtg Val	cct Pro	gta Val	gtc Val	gcc Ala 1900	ctg Leu	gct Ala	gag Glu	aag Lys	aat Asn 1905	gga Gly	tct Ser	ata Ile	5724
ctg Leu	cat His 1910	gta Val	ccg Pro	aga Arg	aac Asn	tac Tyr 1915	atg Met	cat His	agt Ser	ctg Leu	ccc Pro 1920	gat Asp	aac Asn	atg Met	5769
gcg Ala	gaa Glu 1925	ggc Gly	gag Glu	gat Asp	agt Ser	tcc Ser 1930	ttc Phe	ttg Leu	ttg Leu	tcc Ser	aca Thr 1935	gct Ala	gca Ala	gcc Ala	5814
ctc Leu	ctt Leu 1940	gcc Ala	gaa Glu	aca Thr	att Ile	ctc Leu 1945	tct Ser	agc Ser	gct Ala	cag Gln	tcc Ser 1950	ttt Phe	ggc Gly	tct Ser	5859
gat Asp	gca Ala 1955	tca Ser	att Ile	ctg Leu	att Ile	atg Met 1960	gag Glu	ccc Pro	cca Pro	atc Ile	ttc Phe 1965	tgc Cys	gtc Val	aaa Lys	5904
gca Ala	att Ile 1970	ctg Leu	gag Glu	tcg Ser	gcc Ala	aaa Lys 1975	acc Thr	tac Tyr	ggg Gly	gtt Val	cag Gln 1980	gtt Val	cat His	ttg Leu	5949
gca Ala	aca Thr 1985	act Thr	ctg Leu	tcc Ser	gac Asp	gtc Val 1990	aaa Lys	act Thr	att Ile	ccg Pro	gct Ala 1995	cct Pro	tgg Trp	atc Ile	5994
cga Arg	tta Leu 2000	cat His	gcc Ala	aag Lys	gaa Glu	acc Thr 2005	gac Asp	gct Ala	cgg Arg	ctg Leu	aaa Lys 2010	cac His	agc Ser	ctg Leu	6039
ccg Pro	aca Thr	aac Asn	atg Met	atg Met	gca Ala	ttc Phe	ttt Phe	gac Asp	ttg Leu	tct Ser	acc Thr	gac Asp	cgg Arg	act Thr	6084

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aca tac aaa gtt agt cat gtt gag gat att cca atc ctc gag cac Thr Tyr Lys Val Ser His Val Glu Asp Ile Pro Ile Leu Glu His 2060 2065 2070			6219
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gac act gag aaa gtt att aca gcc aca caa att ctc ttg cct ggt Asp Thr Glu Lys Val Ile Thr Ala Thr Gln Ile Leu Leu Pro Gly 2090 2095 2100			6309
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Leu 305	Asp	Ile	Thr	Asn 310	Pro	Gln	Glu	Arg	Cys	Gln 315	Phe	Phe	Glu	Ala	His 320
Gly	Thr	Gly	Thr	Pro 325	Ala	Gly	Asp	Pro	Gln 330	Glu	Ala	Glu	Ala	Ile 335	Ala
Thr	Ala	Phe	Phe 340	Gly	His	Lys	Asp	Gly 345	Thr	Ile	Asp	Ser	Asp 350	Gly	Glu
Lys	Asp	Glu 355	Leu	Phe	Val	Gly	Ser 360	Ile	Lys	Thr	Val	Leu 365	Gly	His	Thr
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Arg	Val	Ala	Pro	Phe 405	Tyr	Thr	His	Leu	Lys 410	Ile	Ala	Thr	Glu	Ala 415	Thr
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Arg	Ser	Met	Lys	Ala 485	Thr	Leu	Glu	Asn	Met 490	Leu	Gln	Phe	Leu	Glu 495	Thr
His	Asp	Asp	Val 500	Asp	Met	His	Asp	Ile 505	Ala	Tyr	Thr	Leu	Leu 510	Glu	Lys
Arg	Ser	Ile 515	Leu	Pro	Phe	Arg	Arg 520	Ala	Ile	Ala	Ala	His 525	Asn	Lys	Glu
Val	Ala 530	Arg	Ala	Ala	Leu	Glu 535	Ala	Ala	Ile	Ala	Asp 540	Gly	Glu	Val	Val
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Phe	Thr	Gly	Gln	Gly 565	Ala	Gln	Trp	Pro	Gly 570	Met	Leu	Lys	Lys	Leu 575	Met



Gln Lys Ala Val Ile Thr His Arg Leu Ile Asp Val Ala Ile Glu Ile  
835 840 845

Gly Ala His Pro Ala Leu Lys Gly Pro Cys Leu Ala Thr Ile Lys Asp  
 850 855 860

Ala Leu Ala Gly Val Glu Leu Pro Tyr Thr Gly Cys Leu Ala Arg Asn  
 865 870 875 880

Val Asp Asp Val Asp Ala Phe Ala Gly Gly Leu Gly Tyr Ile Trp Glu  
 885 890 895

Arg Phe Gly Val Arg Ser Ile Asp Ala Glu Gly Phe Val Gln Gln Val  
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Gln His Leu Arg Gly Gly Ala Pro His Leu Leu Leu Gly Lys Leu Ser  
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Ser Tyr Ser Thr Ala Ser Thr Phe Gln Trp Thr Asn Phe Ile Arg Pro  
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Arg Asp Leu Glu Trp Leu Asp Gly His Ala Leu Gln Gly Gln Thr Val  
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Phe Pro Ala Ala Gly Tyr Ile Ile Met Ala Met Glu Ala Ala Met Lys  
 995 1000 1005

Val Ala Gly Glu Arg Ala Ala Gln Val Gln Leu Leu Glu Ile Leu  
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Pro Glu Glu Glu Tyr Pro Gln Met Asn Asn Val Asn Ile Asp Phe  
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Val Ile 1175	Gly Ala Tyr Ser Ser 1180	Pro Gly Asp Arg Arg 1185	Leu Arg Ser
Leu Tyr 1190	Val Pro Thr His Val 1195	Asp Arg Val Thr Leu 1200	Ile Pro Ser
Leu Cys 1205	Ile Ser Ala Gly Asn 1210	Ser Gly Glu Thr Glu 1215	Leu Ala Phe
Asp Thr 1220	Ile Asn Thr His Asp 1225	Lys Gly Asp Phe Leu 1230	Ser Gly Asp
Ile Thr 1235	Val Tyr Asp Ser Thr 1240	Lys Thr Thr Leu Phe 1245	Gln Val Asp
Asn Ile 1250	Val Phe Lys Pro Phe 1255	Ser Pro Pro Thr Ala 1260	Ser Thr Asp
His Arg 1265	Ile Phe Ala Lys Trp 1270	Val Trp Gly Pro Leu 1275	Thr Pro Glu
Lys Leu 1280	Leu Glu Asp Pro Ala 1285	Thr Leu Ile Ile Ala 1290	Arg Asp Lys
Glu Asp 1295	Ile Leu Thr Ile Glu 1300	Arg Ile Val Tyr Phe 1305	Tyr Ile Lys
Ser Phe 1310	Leu Ala Gln Ile Thr 1315	Pro Asp Asp Arg Gln 1320	Asn Ala Asp
Leu His 1325	Ser Gln Lys Tyr Ile 1330	Glu Trp Cys Asp Gln 1335	Val Gln Ala
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Glu Asp 1355	Thr Ser Val His Ile 1360	Glu Gln Met Cys Glu 1365	Ser Asn Ser
Ser His 1370	Pro His Val Arg Leu 1375	Ile Gln Arg Val Gly 1380	Lys Glu Leu

146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000

Ile Ser Ile Val Arg Gly Asn Gly Asp Pro Leu Asp Ile Met Asn  
 1385 1390 1395  
 Arg Asp Gly Leu Phe Thr Glu Tyr Tyr Thr Asn Lys Leu Ala Phe  
 1400 1405 1410  
 Gly Ser Ala Ile His Val Val Gln Asp Leu Val Ser Gln Ile Ala  
 1415 1420 1425  
 His Arg Tyr Gln Ser Ile Asp Ile Leu Glu Ile Gly Leu Gly Thr  
 1430 1435 1440  
 Gly Ile Ala Thr Lys Arg Val Leu Ala Ser Pro Gln Leu Gly Phe  
 1445 1450 1455  
 Asn Ser Tyr Thr Cys Thr Asp Ile Ser Ala Asp Val Ile Gly Lys  
 1460 1465 1470  
 Ala Arg Glu Gln Leu Ser Glu Phe Asp Gly Leu Met Gln Phe Glu  
 1475 1480 1485  
 Ala Leu Asp Ile Asn Arg Ser Pro Ala Glu Gln Gly Phe Lys Pro  
 1490 1495 1500  
 His Ser Tyr Asp Leu Ile Ile Ala Ser Asp Val Leu His Ala Ser  
 1505 1510 1515  
 Ser Asn Phe Glu Glu Lys Leu Ala His Ile Arg Ser Leu Leu Lys  
 1520 1525 1530  
 Pro Gly Gly His Leu Val Thr Phe Gly Val Thr His Arg Glu Pro  
 1535 1540 1545  
 Ala Arg Leu Ala Phe Ile Ser Gly Leu Phe Ala Asp Arg Trp Thr  
 1550 1555 1560  
 Gly Glu Asp Glu Thr Arg Ala Leu Ser Ala Ser Gly Ser Val Asp  
 1565 1570 1575  
 Gln Trp Glu His Thr Leu Lys Arg Val Gly Phe Ser Gly Val Asp  
 1580 1585 1590  
 Ser Arg Thr Leu Asp Arg Glu Asp Asp Leu Ile Pro Ser Val Phe  
 1595 1600 1605  
 Ser Thr His Ala Val Asp Ala Thr Val Glu Arg Leu Tyr Asp Pro  
 1610 1615 1620  
 Leu Ser Ala Pro Leu Lys Asp Ser Tyr Pro Pro Leu Val Val Ile  
 1625 1630 1635  
 Gly Gly Glu Ser Thr Lys Thr Glu Arg Ile Leu Asn Asp Met Lys  
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Ser	Ala	Leu	Pro	His	Arg	His	Ile	His	Ser	Val	Lys	Arg	Leu	Glu
	1655					1660					1665			
Ser	Val	Leu	Asp	Asp	Pro	Ala	Leu	Gln	Pro	Lys	Ser	Thr	Phe	Val
	1670					1675					1680			
Ile	Leu	Ser	Glu	Leu	Asp	Asp	Glu	Val	Phe	Cys	Asn	Leu	Glu	Glu
	1685					1690					1695			
Asp	Lys	Phe	Glu	Ala	Val	Lys	Ser	Leu	Leu	Phe	Tyr	Ala	Gly	Arg
	1700					1705					1710			
Met	Met	Trp	Leu	Thr	Glu	Asn	Ala	Trp	Ile	Asp	His	Pro	His	Gln
	1715					1720					1725			
Ala	Ser	Thr	Ile	Gly	Met	Leu	Arg	Thr	Ile	Lys	Leu	Glu	Asn	Pro
	1730					1735					1740			
Asp	Leu	Gly	Thr	His	Val	Phe	Asp	Val	Asp	Thr	Val	Glu	Asn	Leu
	1745					1750					1755			
Asp	Thr	Lys	Phe	Phe	Val	Glu	Gln	Leu	Leu	Arg	Phe	Glu	Glu	Ser
	1760					1765					1770			
Asp	Asp	Gln	Leu	Leu	Glu	Ser	Ile	Thr	Trp	Thr	His	Glu	Pro	Glu
	1775					1780					1785			
Val	Tyr	Trp	Cys	Lys	Gly	Arg	Ala	Trp	Val	Pro	Arg	Leu	Lys	Gln
	1790					1795					1800			
Asp	Ile	Ala	Arg	Asn	Asp	Arg	Met	Asn	Ser	Ser	Arg	Arg	Pro	Ile
	1805					1810					1815			
Phe	Gly	Asn	Phe	Asn	Ser	Ser	Lys	Thr	Ala	Ile	Ala	Leu	Lys	Glu
	1820					1825					1830			
Ala	Arg	Gly	Ala	Ser	Ser	Ser	Met	Tyr	Tyr	Leu	Glu	Ser	Thr	Glu
	1835					1840					1845			
Thr	Cys	Asp	Ser	Leu	Glu	Asp	Ala	Arg	His	Ala	Gly	Lys	Ala	Thr
	1850					1855					1860			
Val	Arg	Val	Arg	Tyr	Ala	Leu	Pro	Gln	Ala	Ile	Arg	Val	Gly	His
	1865					1870					1875			
Leu	Gly	Tyr	Phe	His	Val	Val	Gln	Gly	Ser	Ile	Leu	Glu	Asn	Thr
	1880					1885					1890			
Cys	Glu	Val	Pro	Val	Val	Ala	Leu	Ala	Glu	Lys	Asn	Gly	Ser	Ile
	1895					1900					1905			

Leu 1910	His	Val	Pro	Arg	Asn	Tyr 1915	Met	His	Ser	Leu	Pro 1920	Asp	Asn	Met
Ala 1925	Glu	Gly	Glu	Asp	Ser	Ser 1930	Phe	Leu	Leu	Ser	Thr 1935	Ala	Ala	Ala
Leu 1940	Leu	Ala	Glu	Thr	Ile	Leu 1945	Ser	Ser	Ala	Gln	Ser 1950	Phe	Gly	Ser
Asp 1955	Ala	Ser	Ile	Leu	Ile	Met 1960	Glu	Pro	Pro	Ile	Phe 1965	Cys	Val	Lys
Ala 1970	Ile	Leu	Glu	Ser	Ala	Lys 1975	Thr	Tyr	Gly	Val	Gln 1980	Val	His	Leu
Ala 1985	Thr	Thr	Leu	Ser	Asp	Val 1990	Lys	Thr	Ile	Pro	Ala 1995	Pro	Trp	Ile
Arg 2000	Leu	His	Ala	Lys	Glu	Thr 2005	Asp	Ala	Arg	Leu	Lys 2010	His	Ser	Leu
Pro 2015	Thr	Asn	Met	Met	Ala	Phe 2020	Phe	Asp	Leu	Ser	Thr 2025	Asp	Arg	Thr
Ala 2030	Ala	Gly	Ile	Thr	Asn	Arg 2035	Leu	Ala	Lys	Leu	Leu 2040	Pro	Pro	Ser
Cys 2045	Phe	Met	Tyr	Ser	Gly	Asp 2050	Tyr	Leu	Ile	Arg	Ser 2055	Thr	Ala	Ser
Thr 2060	Tyr	Lys	Val	Ser	His	Val 2065	Glu	Asp	Ile	Pro	Ile 2070	Leu	Glu	His
Ser 2075	Val	Ala	Met	Ala	Lys	Asn 2080	Thr	Val	Ser	Ala	Ser 2085	Thr	Val	Asp
Asp 2090	Thr	Glu	Lys	Val	Ile	Thr 2095	Ala	Thr	Gln	Ile	Leu 2100	Leu	Pro	Gly
Gln 2105	Leu	Ser	Val	Asn	His	Asn 2110	Asp	Gln	Arg	Phe	Asn 2115	Leu	Ala	Thr
Val 2120	Ile	Asp	Trp	Lys	Glu	Asn 2125	Glu	Val	Ser	Ala	Arg 2130	Ile	Cys	Pro
Ile 2135	Asp	Ser	Gly	Asn	Leu	Phe 2140	Ser	Asn	Lys	Lys	Thr 2145	Tyr	Leu	Leu
Val 2150	Gly	Leu	Thr	Gly	Asp	Leu 2155	Gly	Arg	Ser	Leu	Cys 2160	Arg	Trp	Met
Ile 2165	Leu	His	Gly	Ala	Arg	His 2170	Val	Val	Leu	Thr	Ser 2175	Arg	Asn	Pro

Arg	Leu	Asp	Pro	Lys	Trp	Ile	Ala	Asn	Met	Glu	Ala	Leu	Gly	Gly
	2180					2185					2190			
Asp	Ile	Thr	Val	Leu	Ser	Met	Asp	Val	Ala	Asn	Glu	Asp	Ser	Val
	2195					2200					2205			
Asp	Ala	Gly	Leu	Gly	Lys	Leu	Val	Asp	Met	Lys	Leu	Pro	Pro	Val
	2210					2215					2220			
Ala	Gly	Ile	Ala	Phe	Gly	Pro	Leu	Val	Leu	Gln	Asp	Val	Met	Leu
	2225					2230					2235			
Lys	Asn	Met	Asp	His	Gln	Met	Met	Asp	Met	Val	Leu	Lys	Pro	Lys
	2240					2245					2250			
Val	Gln	Gly	Ala	Arg	Ile	Leu	His	Glu	Arg	Phe	Ser	Glu	Gln	Thr
	2255					2260					2265			
Gly	Ser	Lys	Ala	Leu	Asp	Phe	Phe	Ile	Met	Phe	Ser	Ser	Ile	Val
	2270					2275					2280			
Ala	Val	Ile	Gly	Asn	Pro	Gly	Gln	Ser	Asn	Tyr	Gly	Ala	Ala	Asn
	2285					2290					2295			
Ala	Tyr	Leu	Gln	Ala	Leu	Ala	Gln	Gln	Arg	Cys	Ala	Arg	Gly	Leu
	2300					2305					2310			
Ala	Gly	Ser	Thr	Ile	Asp	Ile	Gly	Ala	Val	Tyr	Gly	Val	Gly	Phe
	2315					2320					2325			
Val	Thr	Arg	Ala	Glu	Met	Glu	Glu	Asp	Phe	Asp	Ala	Ile	Arg	Phe
	2330					2335					2340			
Met	Phe	Asp	Ser	Val	Glu	Glu	His	Glu	Leu	His	Thr	Leu	Phe	Ala
	2345					2350					2355			
Glu	Ala	Val	Val	Ser	Asp	Gln	Arg	Ala	Arg	Gln	Gln	Pro	Gln	Arg
	2360					2365					2370			
Lys	Thr	Val	Ile	Asp	Met	Ala	Asp	Leu	Glu	Leu	Thr	Thr	Gly	Ile
	2375					2380					2385			
Pro	Asp	Leu	Asp	Pro	Ala	Leu	Gln	Asp	Arg	Ile	Ile	Tyr	Phe	Asn
	2390					2395					2400			
Asp	Pro	Arg	Phe	Gly	Asn	Phe	Lys	Ile	Pro	Gly	Gln	Arg	Gly	Asp
	2405					2410					2415			
Gly	Gly	Asp	Asn	Gly	Ser	Gly	Ser	Lys	Gly	Ser	Ile	Ala	Asp	Gln
	2420					2425					2430			

Leu	Lys	Gln	Ala	Thr	Thr	Leu	Asp	Gln	Val	Arg	Gln	Ile	Val	Ile
2435						2440					2445			
Asp	Gly	Leu	Ser	Glu	Lys	Leu	Arg	Val	Thr	Leu	Gln	Val	Ser	Asp
2450						2455					2460			
Gly	Glu	Ser	Val	Asp	Pro	Thr	Ile	Pro	Leu	Ile	Asp	Gln	Gly	Val
2465						2470					2475			
Asp	Ser	Leu	Gly	Ala	Val	Thr	Val	Gly	Ser	Trp	Phe	Ser	Lys	Gln
2480						2485					2490			
Leu	Tyr	Leu	Asp	Leu	Pro	Leu	Leu	Arg	Val	Leu	Gly	Gly	Ala	Ser
2495						2500					2505			
Val	Ala	Asp	Leu	Ala	Asp	Asp	Ala	Ala	Thr	Arg	Leu	Pro	Ala	Thr
2510						2515					2520			
Ser	Ile	Pro	Leu	Leu	Leu	Gln	Ile	Gly	Asp	Ser	Thr	Gly	Thr	Ser
2525						2530					2535			
Asp	Ser	Gly	Ala	Ser	Pro	Thr	Pro	Thr	Asp	Ser	His	Asp	Glu	Ala
2540						2545					2550			
Ser	Ser	Ala	Thr	Ser	Thr	Asp	Ala	Ser	Ser	Ala	Glu	Glu	Asp	Glu
2555						2560					2565			
Glu	Gln	Glu	Asp	Asp	Asn	Glu	Gln	Gly	Gly	Arg	Lys	Ile	Leu	Arg
2570						2575					2580			
Arg	Glu	Arg	Leu	Ser	Leu	Gly	Gln	Glu	Tyr	Ser	Trp	Arg	Gln	Gln
2585						2590					2595			
Gln	Met	Val	Lys	Asp	His	Thr	Ile	Phe	Asn	Asn	Thr	Ile	Gly	Met
2600						2605					2610			
Phe	Met	Lys	Gly	Thr	Ile	Asp	Leu	Asp	Arg	Leu	Arg	Arg	Ala	Leu
2615						2620					2625			
Lys	Ala	Ser	Leu	Arg	Arg	His	Glu	Ile	Phe	Arg	Thr	Cys	Phe	Val
2630						2635					2640			
Thr	Gly	Asp	Asp	Tyr	Ser	Ser	Asp	Leu	Asn	Gly	Pro	Val	Gln	Val
2645						2650					2655			
Val	Leu	Lys	Asn	Pro	Glu	Asn	Arg	Val	His	Phe	Val	Gln	Val	Asn
2660						2665					2670			
Asn	Ala	Ala	Glu	Ala	Glu	Glu	Glu	Tyr	Arg	Lys	Leu	Glu	Lys	Thr
2675						2680					2685			
Asn	Tyr	Ser	Ile	Ser	Thr	Gly	Asp	Thr	Leu	Arg	Leu	Val	Asp	Phe
2690						2695					2700			



Tyr Trp Gly Thr Asp Asp His Leu Leu Val Ile Gly Tyr His Arg  
 2705 2710 2715  
 Leu Val Gly Asp Gly Ser Thr Thr Glu Asn Leu Phe Asn Glu Ile  
 2720 2725 2730  
 Gly Gln Ile Tyr Ser Gly Val Lys Met Gln Arg Pro Ser Thr Gln  
 2735 2740 2745  
 Phe Ser Asp Leu Ala Val Gln Gln Arg Glu Asn Leu Glu Asn Gly  
 2750 2755 2760  
 Arg Met Gly Asp Asp Ile Ala Phe Trp Lys Ser Met His Ser Lys  
 2765 2770 2775  
 Val Ser Ser Ser Ala Pro Thr Val Leu Pro Ile Met Asn Leu Ile  
 2780 2785 2790  
 Asn Asp Pro Ala Ala Asn Ser Glu Gln Gln Gln Ile Gln Pro Phe  
 2795 2800 2805  
 Thr Trp Gln Gln Tyr Glu Ala Ile Ala Arg Leu Asp Pro Met Val  
 2810 2815 2820  
 Ala Phe Arg Ile Lys Glu Arg Ser Arg Lys His Lys Ala Thr Pro  
 2825 2830 2835  
 Met Gln Phe Tyr Leu Ala Ala Tyr His Val Leu Leu Ala Arg Leu  
 2840 2845 2850  
 Thr Gly Ser Lys Asp Ile Thr Ile Gly Leu Ala Glu Thr Asn Arg  
 2855 2860 2865  
 Ser Thr Met Glu Glu Ile Ser Ala Met Gly Phe Phe Ala Asn Val  
 2870 2875 2880  
 Leu Pro Leu Arg Phe Asp Glu Phe Val Gly Ser Lys Thr Phe Gly  
 2885 2890 2895  
 Glu His Leu Val Ala Thr Lys Asp Ser Val Arg Glu Ala Met Gln  
 2900 2905 2910  
 His Ala Arg Val Pro Tyr Gly Val Ile Leu Asp Cys Leu Gly Leu  
 2915 2920 2925  
 Asn Leu Pro Thr Ser Gly Glu Glu Pro Lys Thr Gln Thr His Ala  
 2930 2935 2940  
 Pro Leu Phe Gln Ala Val Phe Asp Tyr Lys Gln Gly Gln Ala Glu  
 2945 2950 2955

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atg	aac	aat	acc	ccc	gcc	gta	acc	gca	acc	gca	acc	gca	acc	gca	acc	48
Met	Asn	Asn	Thr	Pro	Ala	Val	Thr	Ala	Thr	Ala	Thr	Ala	Thr	Ala	Thr	
1				5					10					15		
gca	acc	gca	atg	gca	ggc	tcg	gct	tgc	tct	aac	aca	tcc	acg	ccc	att	96
Ala	Thr	Ala	Met	Ala	Gly	Ser	Ala	Cys	Ser	Asn	Thr	Ser	Thr	Pro	Ile	
			20					25					30			
gcc	ata	gtt	gga	atg	gga	tgt	cga	ttt	gct	gga	gat	gca	acg	agt	cca	144
Ala	Ile	Val	Gly	Met	Gly	Cys	Arg	Phe	Ala	Gly	Asp	Ala	Thr	Ser	Pro	
		35					40					45				
cag	aag	ctt	tgg	gaa	atg	gtt	gaa	aga	gga	ggc	agt	gcc	tgg	tct	aag	192
Gln	Lys	Leu	Trp	Glu	Met	Val	Glu	Arg	Gly	Gly	Ser	Ala	Trp	Ser	Lys	
	50					55					60					
gtc	ccc	tcc	tcg	cga	ttc	aat	gtg	aga	gga	gta	tac	cac	ccg	aat	ggc	240
Val	Pro	Ser	Ser	Arg	Phe	Asn	Val	Arg	Gly	Val	Tyr	His	Pro	Asn	Gly	
65					70					75					80	
gaa	agg	gtc	ggg	tcc	acc	cac	gta	aag	ggt	gga	cac	ttc	atc	gac	gag	288
Glu	Arg	Val	Gly	Ser	Thr	His	Val	Lys	Gly	Gly	His	Phe	Ile	Asp	Glu	
				85					90					95		
gat	cct	gct	tta	ttt	gac	gcc	gcg	ttc	ttc	aac	atg	acc	aca	gag	gtc	336
Asp	Pro	Ala	Leu	Phe	Asp	Ala	Ala	Phe	Phe	Asn	Met	Thr	Thr	Glu	Val	
			100					105					110			
gcc	agc	tgc	atg	gat	ccg	cag	tat	cgg	ctt	atg	ctt	gag	gtg	gtc	tac	384
Ala	Ser	Cys	Met	Asp	Pro	Gln	Tyr	Arg	Leu	Met	Leu	Glu	Val	Val	Tyr	
		115					120					125				
gaa	tcg	ctg	gag	agt	gcc	ggt	atc	acc	atc	gat	ggt	atg	gca	ggc	tct	432
Glu	Ser	Leu	Glu	Ser	Ala	Gly	Ile	Thr	Ile	Asp	Gly	Met	Ala	Gly	Ser	
	130					135					140					
aat	acg	tcg	gtg	ttt	ggg	ggt	gtc	atg	tac	cac	gac	tat	cag	gat	tcg	480
Asn	Thr	Ser	Val	Phe	Gly	Gly	Val	Met	Tyr	His	Asp	Tyr	Gln	Asp	Ser	
145					150					155					160	

tcc Leu	aat Asn	cgt Arg	gac Asp	ccc Pro 165	gag Glu	aca Thr	gtt Val	ccg Pro	cgt Arg 170	tat Tyr	ttc Phe	ata Ile	act Thr	ggc Gly 175	aac Asn	528
tca Ser	gga Gly	aca Thr	atg Met 180	ctt Leu	tcg Ser	aac Asn	cgg Arg 185	ata Ile	tca Ser	cac His	ttc Phe	tac Tyr	gac Asp 190	tta Leu	cgt Arg	576
ggc Gly	ccc Pro	agc Ser 195	gtg Val	acg Thr	gtt Val	gac Asp	acg Thr 200	gcc Ala	tgt Cys	tcg Ser	acg Thr 205	aca Thr	ttg Leu	acc Thr	gca Ala	624
ctg Leu	cac His 210	ttg Leu	gcg Ala	tgc Cys	cag Gln	agc Ser 215	tta Leu	cgt Arg	act Thr	ggg Gly 220	gag Glu	tca Ser	gat Asp	aca Thr	gcc Ala	672
atc Ile 225	gtt Val	atc Ile	ggt Gly	gca Ala	aat Asn 230	ctt Leu	ctg Leu	ctc Leu	aat Asn 235	ccc Pro	gat Asp	gtt Val	ttt Phe	gtt Val	acg Thr 240	720
atg Met	tca Ser	aac Asn	ctg Leu	gga Gly 245	ttt Phe	ttg Leu	tcc Ser	ccg Pro	gat Asp 250	ggc Gly	atc Ile	tcg Ser	tac Tyr	tct Ser 255	ttt Phe	768
gat Asp	cct Pro	cga Arg	gcg Ala 260	aat Asn	gga Gly	tat Tyr	ggc Gly	cgc Arg 265	ggg Gly	gaa Glu	gga Gly	att Ile	gcc Ala 270	gct Ala	ctg Leu	816
gta Val	ata Ile	aag Lys 275	gcc Ala	ctc Leu	cct Pro	aac Asn	gcg Ala 280	ttg Leu	cga Arg	gac Asp	caa Gln 285	gac Asp	cct Pro	atc Ile	cga Arg	864
gcc Ala	gtc Val 290	att Ile	cga Arg	gag Glu	aca Thr	gcg Ala 295	ctg Leu	aac Asn	cag Gln	gat Asp	ggc Gly 300	aaa Lys	aca Thr	ccc Pro	gca Ala	912
att Ile 305	act Thr	gcg Ala	ccg Pro	agt Ser 310	gat Asp	gtg Val	gcg Ala	cag Gln	aaa Lys 315	agt Ser	ctg Leu	atc Ile	cag Gln	gag Glu	tgt Cys 320	960
tac Tyr	gat Asp	aag Lys	gct Ala	ggg Gly 325	cta Leu	gat Asp	atg Met	tcg Ser	ttg Leu 330	acc Thr	tcg Ser	tac Tyr	gtg Val	gag Glu 335	gcc Ala	1008
cac His	gga Gly	act Thr	gga Gly 340	aca Thr	cca Pro	act Thr	ggt Gly 345	gac Asp	ccc Pro	ctt Leu	gaa Glu	atc Ile	tca Ser 350	gca Ala	att Ile	1056
tca Ser	gca Ala	gct Ala 355	ttt Phe	aaa Lys	gga Gly	cat His	cct Pro 360	ctg Leu	cac His	ctt Leu	ggc Gly 365	tct Ser 365	gtg Val	aaa Lys	gca Ala	1104
aat Asn	att Ile 370	ggc Gly	cat His	aca Thr	gaa Glu	gcc Ala 375	gcc Ala	agt Ser	ggc Gly	ctg Leu	gcc Ala 380	agt Ser	ata Ile	atc Ile	aag Lys	1152
gtg Val 385	gcc Ala	ttg Leu	gcc Ala	ttg Leu	gag Glu 390	aag Lys	ggc Gly	ttg Leu	att Ile	ccc Pro 395	cct Pro	aat Asn	gcg Ala	cgg Arg	ttc Phe 400	1200
ctg Leu	caa Gln	aag Lys	aac Asn	agc Ser 405	aag Lys	ctg Leu	atg Met	ctt Leu	gac Asp 410	caa Gln	aag Lys	aac Asn	atc Ile	aag Lys 415	atc Ile	1248
ccc Pro	atg Met	tct Ser	gct Ala 420	caa Gln	gac Asp	tgg Trp	cct Pro	gtg Val 425	aaa Lys	gat Asp	ggg Gly	act Thr	cgt Arg 430	cgc Arg	gca Ala	1296
tct Ser	gtc Val	aat Asn	aac Asn	ttc Phe	ggc Gly	ttt Phe	ggt Gly	ggt Gly	tcg Ser	aat Asn	gct Ala	cac His	gtc Val	att Ile	ttg Leu	1344

435					440					445						
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450					455					460						
gtc Val	aat Asn	ggt Gly	aac Asn	tct Ser	gag Glu	cat His	ggt Gly	agg Arg	gtt Val	gag Glu	gat Asp	ggt Gly	tcc Ser	aaa Lys	cag Gln	1440
465					470					475						
agc Ser	cgc Arg	ata Ile	tac Tyr	gtt Val	gtg Val	cgt Arg	gcc Ala	aag Lys	gac Asp	gag Glu	caa Gln	gct Ala	tgt Cys	cgg Arg	cga Arg	1488
485					490					495						
acg Thr	ata Ile	gca Ala	agc Ser	ctg Leu	cga Arg	gac Asp	tac Tyr	att Ile	aaa Lys	tcc Ser	gtc Val	gct Ala	gac Asp	att Ile	gac Asp	1536
500					505					510						
ggg Gly	gaa Glu	ccc Pro	ttc Phe	ctc Leu	gcc Ala	agc Ser	ctc Leu	gcc Ala	tat Tyr	aca Thr	cta Leu	ggc Gly	tct Ser	cgc Arg	cgt Arg	1584
515					520					525						
tcc Ser	att Ile	ctg Leu	cca Pro	tgg Trp	acg Thr	tca Ser	gtg Val	tat Tyr	gta Val	gca Ala	gac Asp	agc Ser	ctt Leu	ggc Gly	ggc Gly	1632
530					535					540						
ctt Leu	gtt Val	tct Ser	gcc Ala	ctc Leu	agc Ser	gat Asp	gag Glu	tcc Ser	aat Asn	caa Gln	cca Pro	aaa Lys	cga Arg	gcg Ala	aat Asn	1680
545					550					555						
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565					570					575						
cat His	gca Ala	atg Met	ggc Gly	aga Arg	gag Glu	ctg Leu	gtc Val	aat Asn	aca Thr	ttc Phe	cca Pro	gta Val	ttc Phe	aaa Lys	cag Gln	1776
580					585					590						
gcg Ala	att Ile	ctt Leu	gaa Glu	tgt Cys	gat Asp	ggc Gly	tac Tyr	atc Ile	aag Lys	caa Gln	ctg Leu	ggc Gly	gcg Ala	agt Ser	tgg Trp	1824
595					600					605						
aat Asn	ttt Phe	atg Met	gag Glu	gag Glu	ctc Leu	cac His	cgt Arg	gat Asp	gag Glu	ctg Leu	acg Thr	act Thr	cgg Arg	gta Val	aat Asn	1872
610					615					620						
gat Asp	gcc Ala	gaa Glu	tac Tyr	agt Ser	cta Leu	cca Pro	ctg Leu	tca Ser	acc Thr	gct Ala	atc Ile	caa Gln	att Ile	gca Ala	ctt Leu	1920
625					630					635						
gtg Val	cgt Arg	ctc Leu	ctt Leu	tgg Trp	tca Ser	tgg Trp	gga Gly	att Ile	cgg Arg	cca Pro	acg Thr	ggg Gly	ata Ile	acc Thr	agt Ser	1968
645					650					655						
cac His	tca Ser	agt Ser	gga Gly	gag Glu	gct Ala	gct Ala	gct Ala	gcc Ala	tac Tyr	gca Ala	gct Ala	ggg Gly	gct Ala	tta Leu	tcc Ser	2016
660					665					670						
gcg Ala	cgg Arg	tcg Ser	gcc Ala	att Ile	ggg Gly	atc Ile	act Thr	tat Tyr	ata Ile	cgc Arg	ggt Gly	gta Val	ttg Leu	acc Thr	act Thr	2064
675					680					685						
aag Lys	ccc Pro	aag Lys	ccc Pro	gca Ala	ttg Leu	gca Ala	gcc Ala	aaa Lys	gga Gly	gga Gly	atg Met	atg Met	gcg Ala	gtg Val	ggt Gly	2112
690					695					700						
ctt Leu	ggt Gly	cgc Arg	agt Ser	gag Glu	acc Thr	aat Asn	gtt Val	tac Tyr	att Ile	tcg Ser	cgt Arg	ctc Leu	aac Asn</			

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gtg Val	tcg Ser	gga Gly	gat Asp 740	ttg Leu	ggt Gly	gca Ala	atc Ile	gag Glu 745	aaa Lys	ctt Leu	gaa Glu	aag Lys	ttg Leu 750	tta Leu	cac His	2256
gcc Ala	gat Asp	ggc Gly 755	atc Ile	ttt Phe	acc Thr	agg Arg	aaa Lys 760	ctg Leu	aaa Lys	gtc Val	act Thr	gaa Glu 765	gcc Ala	ttc Phe	cat His	2304
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gat Asp 785	ctg Leu	ttc Phe	aac Asn	tcg Ser	gat Asp 790	aac Asn	aac Asn	aac Asn	gac Asp	aat Asn 795	ccc Pro	aat Asn	gct Ala	gac Asp	acc Thr 800	2400
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cag Gln	ccg Pro	gta Val 835	gag Glu	ttc Phe	gag Glu	tcc Ser	tca Ser 840	ctc Leu	cgc Arg	gag Glu	atg Met	tgc Cys 845	ttt Phe	gat Asp	ccc Pro	2544
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gga Gly 865	gcg Ala	ctt Leu	ggt Gly	ggt Gly	cca Pro 870	atc Ile	aac Asn	caa Gln	gtc Val	atg Met 875	cag Gln	gat Asp	ctg Leu	ggt Gly	ctg Leu 880	2640
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tcg Ser	ttg Leu	gag Glu	aca Thr 900	atg Met	tat Tyr	cgt Arg	gct Ala	gct Ala 905	acg Thr	gag Glu	ttg Leu	ata Ile	agc Ser 910	aag Lys	ggt Gly	2736
tat Tyr	ggg Gly	ctc Leu 915	aaa Lys	atg Met	gac Asp	gct Ala	ata Ile 920	aac Asn	ttt Phe	cct Pro	cat His	gga Gly 925	aga Arg	aaa Lys	gag Glu	2784
ccc Pro	aga Arg 930	gtg Val	aag Lys	gta Val	ctg Leu	agc Ser 935	gat Asp	ttg Leu	ccg Pro	gcg Ala	tac Tyr 940	ccg Pro	tgg Trp	aat Asn	cac His	2832
caa Gln 945	acc Thr	cgt Arg	tat Tyr	tgg Trp	aga Arg 950	gag Glu	cct Pro	cgc Arg	ggc Gly	agt Ser 955	cgt Arg	gag Glu	tcc Ser	aaa Lys	cag Gln 960	2880
aga Arg	acc Thr	cat His	ccg Pro	cct Pro 965	cac His	act Thr	ttg Leu	ata Ile	ggc Gly 970	tca Ser	cgg Arg	gaa Glu	tct Ser	ctc Leu 975	tct Ser	2928
cct Pro	cat His	ttc Phe	gcg Ala 980	cct Pro	aaa Lys	tgg Trp	aaa Lys	cat His 985	gtt Val	ctc Leu	cgT Arg	ctg Leu	tca Ser 990	gat Asp	att Ile	2976
cca Pro	tgg Trp	ata Ile	cga Arg	gat Asp	cac His	gtc Val	gtt Val	ggt Gly	tcg Ser	agc Ser	atc Ile	atc Ile	ttt Phe	ccg Pro	gga Gly	3024

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cca Pro	cca Pro 1025	gtt Val	gcg Ala	ggg Gly	gct Ala	agc Ser 1030	atc Ile	aac Asn	tac Tyr	aac Asn	ttg Leu 1035	cgt Arg	gac Asp	gtt Val	3114	
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cg Arg	agg Arg 1115	ttg Leu	aat Asn	cta Leu	ggc Gly	tca Ser 1120	gat Asp	aac Asn	cg Arg	agc Ser	att Ile 1125	gat Asp	ccc Pro	aac Asn	3384	
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cat His	ctg Leu 1355	gat Asp	ggc Gly	cac His	ctt Leu	cag Gln 1360	aag Lys	tat Tyr	ttc Phe	gat Asp	tgg Trp 1365	atg Met	aat Asn	gtc Val	4104
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gac Asp	gtg Val	atg Met	act Thr	ttc Phe	aaa Lys	aaa Lys	ttg Leu	gat Asp	att Ile	gaa Glu	agc Ser	gat Asp	ccc Pro	gag Glu	4599

1520	1525	1530	
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cca ggt tgg tgg ctc agt gag gag cct gag cgg aag tcg acg cca Pro Gly Trp Trp Leu Ser Glu Glu Pro Glu Arg Lys Ser Thr Pro 1595 1600 1605			4824
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aca acc ccg gat aca gtg gca gaa tcg gag gtg ctt ttg ctg cac Thr Thr Pro Asp Thr Val Ala Glu Ser Glu Val Leu Leu Leu His 1655 1660 1665			5004
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gca Ala	cta Leu 1940	ctg Leu	aaa Lys	ggc Gly	cat His	tgg Trp 1945	gcg Ala	acc Thr	aga Arg	aca Thr	cag Gln 1950	acg Thr	ccg Pro	tac Tyr	5859
act Thr	aat Asn 1955	gtc Val	gtc Val	cgt Arg	att Ile	ccg Pro 1960	gac Asp	gaa Glu	atg Met	ggc Gly	ttc Phe 1965	cca Pro	gaa Glu	gcc Ala	5904
gct Ala	tcg Ser 1970	gtc Val	ccc Pro	ctg Leu	gct Ala	ttc Phe 1975	act Thr	acc Thr	gca Ala	tat Tyr	att Ile 1980	gcg Ala	ctt Leu	tat Tyr	5949
acc Thr	acg Thr 1985	gca Ala	aag Lys	cta Leu	cga Arg	cga Arg 1990	ggc Gly	gaa Glu	aga Arg	gtc Val	ttg Leu 1995	atc Ile	cac His	agt Ser	5994
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tcg Ser	agc Ser	agg Arg	aat Asn	gac Asp	tta Leu	ttc Phe	gtc Val	gac Asp	ggc Gly	atc Ile	aaa Lys	gcc Ala	tac Tyr	acg Thr	6174

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Tyr	Leu	His	Lys	Ile	Ala	Gln	Asp	Val	Asp	Phe	Phe	Val	Met	Leu	
	2315					2320					2325				
tca	tcc	ctt	gtt	ggg	gtc	atg	ggg	ggg	gca	ggc	cag	gcc	aat	tac	7029
Ser	Ser	Leu	Val	Gly	Val	Met	Gly	Gly	Ala	Gly	Gln	Ala	Asn	Tyr	
	2330					2335					2340				
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Asp	Val	Leu	Glu	Lys	Ala	Ile	Leu	Cys	Ser	Ser	Pro	Gln	Phe	Pro	
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tca	cct	ccc	gca	gct	gtg	gtt	aca	gga	atc	aac	aca	tcc	cgg	ggg	7299
Ser	Pro	Pro	Ala	Ala	Val	Val	Thr	Gly	Ile	Asn	Thr	Ser	Pro	Gly	
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Gly	Leu	Lys	Tyr	Arg	Gln	Val	Leu	His	Ala	Asp	Gln	Ser	Phe	Val	
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Arg	Val	Thr	Ser	His	Asp	Glu	Ala	Ile	Ser	Ile	Val	Leu	Lys	Ala	
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Met	Thr	Glu	Lys	Leu	Met	Arg	Met	Phe	Gly	Leu	Ala	Glu	Asp	Asp	
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Met	Ser	Ser	Ser	Lys	Asn	Leu	Ala	Gly	Val	Gly	Val	Asp	Ser	Leu	
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Val	Ala	Ile	Glu	Leu	Arg	Asn	Trp	Ile	Thr	Ser	Glu	Ile	His	Val	
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gat	gtg	tcg	atc	ttt	gag	ctc	atg	aat	ggg	aac	acc	atc	gcc	ggc	7659
Asp	Val	Ser	Ile	Phe	Glu	Leu	Met	Asn	Gly	Asn	Thr	Ile	Ala	Gly	
	2540					2545					2550				
ctc	gtc	gag	tta	gtt	gtg	gcg	aaa	tgc	agt	taa					7692
Leu	Val	Glu	Leu	Val	Val	Ala	Lys	Cys	Ser						
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Ala Ile Val Gly Met Gly Cys Arg Phe Ala Gly Asp Ala Thr Ser Pro  
35 40 45

Gln Lys Leu Trp Glu Met Val Glu Arg Gly Gly Ser Ala Trp Ser Lys  
50 55 60

Val Pro Ser Ser Arg Phe Asn Val Arg Gly Val Tyr His Pro Asn Gly  
65 70 75 80

Glu Arg Val Gly Ser Thr His Val Lys Gly Gly His Phe Ile Asp Glu  
85 90 95

Asp Pro Ala Leu Phe Asp Ala Ala Phe Phe Asn Met Thr Thr Glu Val  
100 105 110

Ala Ser Cys Met Asp Pro Gln Tyr Arg Leu Met Leu Glu Val Val Tyr  
115 120 125

Glu Ser Leu Glu Ser Ala Gly Ile Thr Ile Asp Gly Met Ala Gly Ser  
130 135 140

Asn Thr Ser Val Phe Gly Gly Val Met Tyr His Asp Tyr Gln Asp Ser  
145 150 155 160

Leu Asn Arg Asp Pro Glu Thr Val Pro Arg Tyr Phe Ile Thr Gly Asn  
165 170 175

Ser Gly Thr Met Leu Ser Asn Arg Ile Ser His Phe Tyr Asp Leu Arg  
180 185 190

Gly Pro Ser Val Thr Val Asp Thr Ala Cys Ser Thr Thr Leu Thr Ala  
195 200 205

Leu His Leu Ala Cys Gln Ser Leu Arg Thr Gly Glu Ser Asp Thr Ala  
210 215 220

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Ile Val Ile Gly Ala Asn Leu Leu Leu Asn Pro Asp Val Phe Val Thr  
225                      230                      235                      240
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Met Ser Asn Leu Gly Phe Leu Ser Pro Asp Gly Ile Ser Tyr Ser Phe  
245 250 255

Ser Ile Leu Pro Trp Thr Ser Val Tyr Val Ala Asp Ser Leu Gly Gly  
530 535 540

Ser Lys Gly Val Leu Tyr Ser Ser Pro Lys Thr Gly Ser Arg Met Thr  
805 810 815

Asp Leu Lys Leu Leu Leu Asp Pro Thr His Trp Met Asp Ser Met Leu  
820 825 830

Gln Pro Val Glu Phe Glu Ser Ser Leu Arg Glu Met Cys Phe Asp Pro  
835 840 845

Asn Thr Lys Glu Lys Ala Val Asp Val Ile Ile Glu Ile Gly Pro His  
850 855 860

Gly Ala Leu Gly Gly Pro Ile Asn Gln Val Met Gln Asp Leu Gly Leu  
865 870 875 880

Lys Gly Thr Asp Ile Asn Tyr Leu Ser Cys Leu Ser Arg Gly Arg Ser  
885 890 895

Ser Leu Glu Thr Met Tyr Arg Ala Ala Thr Glu Leu Ile Ser Lys Gly  
900 905 910

Tyr Gly Leu Lys Met Asp Ala Ile Asn Phe Pro His Gly Arg Lys Glu  
915 920 925

Pro Arg Val Lys Val Leu Ser Asp Leu Pro Ala Tyr Pro Trp Asn His  
930 935 940

Gln Thr Arg Tyr Trp Arg Glu Pro Arg Gly Ser Arg Glu Ser Lys Gln  
945 950 955 960

Arg Thr His Pro Pro His Thr Leu Ile Gly Ser Arg Glu Ser Leu Ser  
965 970 975

Pro His Phe Ala Pro Lys Trp Lys His Val Leu Arg Leu Ser Asp Ile  
980 985 990

Pro Trp Ile Arg Asp His Val Val Gly Ser Ser Ile Ile Phe Pro Gly  
995 1000 1005

Ala Gly Phe Ile Ser Met Ala Ile Glu Gly Phe Ser Gln Val Cys  
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Pro Pro Val Ala Gly Ala Ser Ile Asn Tyr Asn Leu Arg Asp Val  
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Glu Leu Ala Gln Ala Leu Ile Ile Pro Ala Asp Ala Glu Ala Glu  
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Val Asp Leu Arg Leu Thr Ile Arg Ser Cys Glu Glu Arg Ser Leu  
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Gly Thr Lys Asn Trp His Gln Phe Ser Val His Ser Ile Ser Gly  
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Glu Asn Asn Thr Trp Thr Glu His Cys Thr Gly Leu Ile Arg Ser  
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Ile Phe Gln Asn Ile Gln Arg Ile Gln Asn Asn Gly Gln Gly Ser  
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Phe Cys Arg Phe Ser Ile Ala Asp Thr Ala Ser Ala Met Pro His  
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Ser Tyr Glu Asn Arg His Ile Val His Pro Thr Thr Leu Asp Ser  
1175 1180 1185

Val Ile Gln Ala Ala Tyr Thr Val Leu Pro Tyr Ala Gly Thr Arg  
1190 1195 1200

Met Lys Thr Ala Met Val Pro Arg Arg Leu Arg Asn Val Lys Ile  
1205 1210 1215

Ser Ser Ser Leu Ala Asp Leu Glu Ala Gly Asp Ala Leu Asp Ala  
1220 1225 1230

Gln Ala Ser Ile Lys Asp Arg Asn Ser Gln Ser Phe Ser Thr Asp  
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Leu Ala Val Phe Asp Asp Tyr Asp Ser Gly Ser Ser Pro Ser Asp  
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Gly Ile Pro Val Ile Glu Ile Glu Gly Leu Val Phe Gln Ser Val  
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Gly Ser Ser Phe Ser Asp Gln Lys Ser Asp Ser Asn Asp Thr Glu  
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Asn Ala Cys Ser Ser Trp Val Trp Ala Pro Asp Ile Ser Leu Gly  
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Asp Ser Thr Trp Leu Lys Glu Lys Leu Ser Thr Glu Ala Glu Thr  
1310 1315 1320

Lys Glu Thr Glu Leu Met Met Asp Leu Arg Arg Cys Thr Ile Asn  
1325 1330 1335

Phe Ile Gln Glu Ala Val Thr Asp Leu Thr Asn Ser Asp Ile Gln  
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His	Leu	Asp	Gly	His	Leu	Gln	Lys	Tyr	Phe	Asp	Trp	Met	Asn	Val
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Gln	Leu	Asp	Leu	Ala	Arg	Gln	Asn	Lys	Leu	Ser	Pro	Ala	Ser	Cys
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Asp	Trp	Leu	Ser	Asp	Asp	Ala	Glu	Gln	Lys	Lys	Cys	Leu	Gln	Ala
1385						1390					1395			
Arg	Val	Ala	Gly	Glu	Ser	Val	Asn	Gly	Glu	Met	Ile	Ser	Arg	Leu
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Ala 1970	Ser	Val	Pro	Leu	Ala 1975	Phe	Thr	Thr	Ala	Tyr	Ile 1980	Ala	Leu	Tyr
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Leu 2120	Ser	Trp	Gln	Arg	Ala 2125	Lys	Ser	Glu	Glu	Val	Ser 2130	Glu	Ala	Leu
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Leu	Cys	Glu	Glu	Ala	His	Ala	Pro	Pro	Ile	Arg	Gly	Ile	Ile	Gln
2270						2275					2280			
Gly	Ala	Met	Val	Leu	Lys	Asp	Ala	Leu	Leu	Ser	Arg	Met	Thr	Leu
2285						2290					2295			
Asp	Glu	Phe	Asn	Ala	Ala	Thr	Arg	Pro	Lys	Val	Gln	Gly	Ser	Trp
2300						2305					2310			
Tyr	Leu	His	Lys	Ile	Ala	Gln	Asp	Val	Asp	Phe	Phe	Val	Met	Leu
2315						2320					2325			
Ser	Ser	Leu	Val	Gly	Val	Met	Gly	Gly	Ala	Gly	Gln	Ala	Asn	Tyr
2330						2335					2340			
Ala	Ala	Ala	Gly	Ala	Phe	Gln	Asp	Ala	Leu	Ala	His	His	Arg	Arg
2345						2350					2355			
Ala	His	Gly	Met	Pro	Ala	Val	Thr	Ile	Asp	Leu	Gly	Met	Val	Lys
2360						2365					2370			
Ser	Val	Gly	Tyr	Val	Ala	Glu	Thr	Gly	Arg	Gly	Val	Ala	Asp	Arg
2375						2380					2385			
Leu	Ala	Arg	Ile	Gly	Tyr	Lys	Pro	Met	His	Glu	Lys	Asp	Val	Met
2390						2395					2400			

Asp Val Leu Glu Lys Ala Ile Leu Cys Ser Ser Pro Gln Phe Pro  
2405 2410 2415

Ser Pro Pro Ala Ala Val Val Thr Gly Ile Asn Thr Ser Pro Gly  
2420 2425 2430

Ala His Trp Thr Glu Ala Asn Trp Ile Gln Glu Gln Arg Phe Val  
2435 2440 2445

Gly Leu Lys Tyr Arg Gln Val Leu His Ala Asp Gln Ser Phe Val  
2450 2455 2460

Ser Ser His Lys Lys Gly Pro Asp Gly Val Arg Ala Gln Leu Ser  
2465 2470 2475

Arg Val Thr Ser His Asp Glu Ala Ile Ser Ile Val Leu Lys Ala  
2480 2485 2490

Met Thr Glu Lys Leu Met Arg Met Phe Gly Leu Ala Glu Asp Asp  
2495 2500 2505

Met Ser Ser Ser Lys Asn Leu Ala Gly Val Gly Val Asp Ser Leu  
2510 2515 2520

Val Ala Ile Glu Leu Arg Asn Trp Ile Thr Ser Glu Ile His Val  
2525 2530 2535

Asp Val Ser Ile Phe Glu Leu Met Asn Gly Asn Thr Ile Ala Gly  
2540 2545 2550

Leu Val Glu Leu Val Val Ala Lys Cys Ser  
2555 2560

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<212> DNA  
<213> Penicillium citrinum

<220>  
<221> CDS  
<222> (1)..(1557)

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1 5 10 15  
acc cct caa gcc ctt gtg gcg gtc gca gtg ctt ctt agt ctc atc gcc 96  
Thr Pro Gln Ala Leu Val Ala Val Ala Val Leu Leu Ser Leu Ile Ala  
20 25 30  
tac cgt ttg cgg ggg cgc cag tcc gaa ctg caa gtc tat aat ccc aaa 144  
Tyr Arg Leu Arg Gly Arg Gln Ser Glu Leu Gln Val Tyr Asn Pro Lys  
35 40 45  
aaa tgg tgg gag ttg acg acc atg agg gct agg cag gac ttc gat acg 192  
Lys Trp Trp Glu Leu Thr Thr Met Arg Ala Arg Gln Asp Phe Asp Thr  
50 55 60

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tat ggt ccg agc tgg atc gaa gct tgg ttc tcg aaa aac gac aag ccc Tyr Gly Pro Ser Trp Ile Glu Ala Trp Phe Ser Lys Asn Asp Lys Pro 65 70 75 80	240
ctg cgc ttc att gtt gat tcc ggc tat tgc acc atc ctc cca tgc tcc Leu Arg Phe Ile Val Asp Ser Gly Tyr Cys Thr Ile Leu Pro Ser Ser 85 90 95	288
atg gcc gac gag ttt cgg aaa atc aaa gat atg tgc atg tac aag ttt Met Ala Asp Glu Phe Arg Lys Ile Lys Asp Met Cys Met Tyr Lys Phe 100 105 110	336
ttg gcg gat gac ttt cac tct cat ctc cct gga ttc gac ggg ttc aag Leu Ala Asp Asp Phe His Ser His Leu Pro Gly Phe Asp Gly Phe Lys 115 120 125	384
gaa atc tgc cag gat gca cat ctt gtc aac aaa gtt gtt ttg aac cag Glu Ile Cys Gln Asp Ala His Leu Val Asn Lys Val Val Leu Asn Gln 130 135 140	432
tta caa acc caa gcc ccc aag tac aca aag cca ttg gct acc ttg gcc Leu Gln Thr Gln Ala Pro Lys Tyr Thr Lys Pro Leu Ala Thr Leu Ala 145 150 155 160	480
gac gct act att gcc aag ttg ttc ggt aaa agc gag gag tgg caa acc Asp Ala Thr Ile Ala Lys Leu Phe Gly Lys Ser Glu Glu Trp Gln Thr 165 170 175	528
gca cct gtc tat tcc aat gga ttg gac ctt gtc aca cga aca gtc aca Ala Pro Val Tyr Ser Asn Gly Leu Asp Leu Val Thr Arg Thr Val Thr 180 185 190	576
ctc att atg gtc ggc gac aaa atc tgc cac aat gag gag tgg ctg gat Leu Ile Met Val Gly Asp Lys Ile Cys His Asn Glu Glu Trp Leu Asp 195 200 205	624
att gca aag aac cat gcc gtg agt gtg gcg gta caa gct cgc caa ctt Ile Ala Lys Asn His Ala Val Ser Val Ala Val Gln Ala Arg Gln Leu 210 215 220	672
cgc gta tgg ccc atg cta ctg cga ccg ctc gct cac tgg ttt caa ccg Arg Val Trp Pro Met Leu Leu Arg Pro Leu Ala His Trp Phe Gln Pro 225 230 235 240	720
caa gga cgc aaa ttg cgt gac caa gtg cgc cgc gca cga aag atc att Gln Gly Arg Lys Leu Arg Asp Gln Val Arg Arg Ala Arg Lys Ile Ile 245 250 255	768
gat cct gag att cag cga cga cgt gct gaa aag gcc gca tgt gta gcg Asp Pro Glu Ile Gln Arg Arg Arg Ala Glu Lys Ala Ala Cys Val Ala 260 265 270	816
aag ggc gtg cag ccg ccc cag tac gtc gat acc atg caa tgg ttt gaa Lys Gly Val Gln Pro Pro Gln Tyr Val Asp Thr Met Gln Trp Phe Glu 275 280 285	864
gac acc gcc gac ggc cgc tgg tac gat gtg gcg ggt gct cag ctc gct Asp Thr Ala Asp Gly Arg Trp Tyr Asp Val Ala Gly Ala Gln Leu Ala 290 295 300	912
atg gat ttc gcc ggc atc tac gcc tcg acg gat ctt ttc gtc ggt gcc Met Asp Phe Ala Gly Ile Tyr Ala Ser Thr Asp Leu Phe Val Gly Ala 305 310 315 320	960
ctt gtg gac att gcc agg cac cca gac ctt att cag cct ctc cgc caa Leu Val Asp Ile Ala Arg His Pro Asp Leu Ile Gln Pro Leu Arg Gln 325 330 335	1008
gag atc cgc act gta atc gga gaa ggg ggc tgg acg cct gcc tct ctg Glu Ile Arg Thr Val Ile Gly Glu Gly Gly Trp Thr Pro Ala Ser Leu	1056

340										345										350										
ttc aag ctg aag ctc ctc gac agc tgc atg aaa gag acg cag cga atc	1104																													
Phe Lys Leu Lys Leu Leu Asp Ser Cys Met Lys Glu Thr Gln Arg Ile																														
355	360	365																												
aag ccg gtc gag tgc gcc act atg cgc agt acc gct ctc aga gac atc	1152																													
Lys Pro Val Glu Cys Ala Thr Met Arg Ser Thr Ala Leu Arg Asp Ile																														
370	375	380																												
act cta tcc aat ggc ctc ttc att ccc aag ggc gag ttg gcc gct gtg	1200																													
Thr Leu Ser Asn Gly Leu Phe Ile Pro Lys Gly Glu Leu Ala Ala Val																														
385	390	395	400																											
gct gca gac cgc atg aac aac cct gat gtg tgg gaa aac ccc gaa aat	1248																													
Ala Ala Asp Arg Met Asn Asn Pro Asp Val Trp Glu Asn Pro Glu Asn																														
405	410	415																												
tat gat ccc tac cga ttt atg cgc atg cgc gag gat cca gac aag gcc	1296																													
Tyr Asp Pro Tyr Arg Phe Met Arg Met Arg Glu Asp Pro Asp Lys Ala																														
420	425	430																												
ttc acc gct caa ttg gag aat acc aac ggt gat cac atc ggc ttc ggc	1344																													
Phe Thr Ala Gln Leu Glu Asn Thr Asn Gly Asp His Ile Gly Phe Gly																														
435	440	445																												
tgg aac cca cgc gct tgt ccc ggg cgg ttc ttc gcc tcg aag gaa atc	1392																													
Trp Asn Pro Arg Ala Cys Pro Gly Arg Phe Phe Ala Ser Lys Glu Ile																														
450	455	460																												
aag att ctc ctc gct cat ata ctg att cag tat gat gtg aag cct gta	1440																													
Lys Ile Leu Leu Ala His Ile Leu Ile Gln Tyr Asp Val Lys Pro Val																														
465	470	475	480																											
cca gga gac gat gac aaa tac tac cgt cac gct ttt agc gtt cgt atg	1488																													
Pro Gly Asp Asp Asp Lys Tyr Tyr Arg His Ala Phe Ser Val Arg Met																														
485	490	495																												
cat cca acc aca aag ctc atg gta cgc cgg cgc aac gag gac atc ccg	1536																													
His Pro Thr Thr Lys Leu Met Val Arg Arg Arg Asn Glu Asp Ile Pro																														
500	505	510																												
ctc cct cat gac cgg tgc taa	1557																													
Leu Pro His Asp Arg Cys																														
515																														

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 <211> 518  
 <212> PRT  
 <213> Penicillium citrinum

<400> 48

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Thr Pro Gln Ala Leu Val Ala Val Ala Val Leu Leu Ser Leu Ile Ala  
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Tyr Arg Leu Arg Gly Arg Gln Ser Glu Leu Gln Val Tyr Asn Pro Lys  
35 40 45

Lys Trp Trp Glu Leu Thr Thr Met Arg Ala Arg Gln Asp Phe Asp Thr  
50 55 60

Tyr 65	Gly	Pro	Ser	Trp	Ile 70	Glu	Ala	Trp	Phe	Ser	Lys 75	Asn	Asp	Lys	Pro 80
Leu	Arg	Phe	Ile 85	Val	Asp	Ser	Gly	Tyr	Cys 90	Thr	Ile	Leu	Pro	Ser 95	Ser
Met	Ala	Asp	Glu 100	Phe	Arg	Lys	Ile	Lys 105	Asp	Met	Cys	Met	Tyr 110	Lys	Phe
Leu	Ala	Asp 115	Asp	Phe	His	Ser	His 120	Leu	Pro	Gly	Phe	Asp 125	Gly	Phe	Lys
Glu 130	Ile	Cys	Gln	Asp	Ala	His 135	Leu	Val	Asn	Lys	Val 140	Val	Leu	Asn	Gln
Leu 145	Gln	Thr	Gln	Ala	Pro 150	Lys	Tyr	Thr	Lys	Pro 155	Leu	Ala	Thr	Leu	Ala 160
Asp	Ala	Thr	Ile	Ala 165	Lys	Leu	Phe	Gly	Lys 170	Ser	Glu	Glu	Trp	Gln 175	Thr
Ala	Pro	Val	Tyr 180	Ser	Asn	Gly	Leu	Asp 185	Leu	Val	Thr	Arg	Thr 190	Val	Thr
Leu	Ile	Met 195	Val	Gly	Asp	Lys	Ile 200	Cys	His	Asn	Glu	Glu 205	Trp	Leu	Asp
Ile 210	Ala	Lys	Asn	His	Ala	Val 215	Ser	Val	Ala	Val	Gln 220	Ala	Arg	Gln	Leu
Arg 225	Val	Trp	Pro	Met	Leu 230	Leu	Arg	Pro	Leu	Ala 235	His	Trp	Phe	Gln	Pro 240
Gln	Gly	Arg	Lys	Leu 245	Arg	Asp	Gln	Val	Arg 250	Arg	Ala	Arg	Lys	Ile 255	Ile
Asp	Pro	Glu	Ile 260	Gln	Arg	Arg	Arg	Ala 265	Glu	Lys	Ala	Ala	Cys 270	Val	Ala
Lys	Gly	Val 275	Gln	Pro	Pro	Gln	Tyr 280	Val	Asp	Thr	Met	Gln 285	Trp	Phe	Glu
Asp	Thr 290	Ala	Asp	Gly	Arg	Trp 295	Tyr	Asp	Val	Ala	Gly 300	Ala	Gln	Leu	Ala
Met 305	Asp	Phe	Ala	Gly	Ile 310	Tyr	Ala	Ser	Thr	Asp 315	Leu	Phe	Val	Gly	Ala 320
Leu	Val	Asp	Ile	Ala 325	Arg	His	Pro	Asp	Leu 330	Ile	Gln	Pro	Leu	Arg 335	Gln
Glu	Ile	Arg	Thr 340	Val	Ile	Gly	Glu	Gly 345	Gly	Trp	Thr	Pro	Ala 350	Ser	Leu



Phe Lys Leu Lys Leu Leu Asp Ser Cys Met Lys Glu Thr Gln Arg Ile  
355 360 365

Lys Pro Val Glu Cys Ala Thr Met Arg Ser Thr Ala Leu Arg Asp Ile  
370 375 380

Thr Leu Ser Asn Gly Leu Phe Ile Pro Lys Gly Glu Leu Ala Ala Val  
385 390 395 400

Ala Ala Asp Arg Met Asn Asn Pro Asp Val Trp Glu Asn Pro Glu Asn  
405 410 415

Tyr Asp Pro Tyr Arg Phe Met Arg Met Arg Glu Asp Pro Asp Lys Ala  
420 425 430

Phe Thr Ala Gln Leu Glu Asn Thr Asn Gly Asp His Ile Gly Phe Gly  
435 440 445

Trp Asn Pro Arg Ala Cys Pro Gly Arg Phe Phe Ala Ser Lys Glu Ile  
450 455 460

Lys Ile Leu Leu Ala His Ile Leu Ile Gln Tyr Asp Val Lys Pro Val  
465 470 475 480

Pro Gly Asp Asp Asp Lys Tyr Tyr Arg His Ala Phe Ser Val Arg Met  
485 490 495

His Pro Thr Thr Lys Leu Met Val Arg Arg Arg Asn Glu Asp Ile Pro  
500 505 510

Leu Pro His Asp Arg Cys  
515

<210> 49  
<211> 3522  
<212> DNA  
<213> Penicillium citrinum

<220>  
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aat cag cag cac cct cta cgc tcg gga aat cgg gca ttg acc tcc aca	96
Asn Gln Gln His Pro Leu Arg Ser Gly Asn Arg Ala Leu Thr Ser Thr	
20 25 30	
ctc caa ttt cta tcc aaa acg gcg tgt cta cac ccg atc cat acc gtt	144
Leu Gln Phe Leu Ser Lys Thr Ala Cys Leu His Pro Ile His Thr Val	
35 40 45	
tgc acc ata gct att cta gct agt acc aca tac gtt gga cta ctc aaa	192
Cys Thr Ile Ala Ile Leu Ala Ser Thr Thr Tyr Val Gly Leu Leu Lys	

50	55	60	
gac agc ttc ttc cat ggc ccc gca aac gtt gat aaa gca gaa tgg ggc Asp Ser Phe Phe His Gly Pro Ala Asn Val Asp Lys Ala Glu Trp Gly 65 70 75 80			240
tct ttg gtc gaa gga agt cga agc ttg atc acc ggc cca cag aat ggc Ser Leu Val Glu Gly Ser Arg Ser Leu Ile Thr Gly Pro Gln Asn Gly 85 90 95			288
tgg aag tgg cag agc ttc gac ggg gat gca gat gtt ctc gga gat ttc Trp Lys Trp Gln Ser Phe Asp Gly Asp Ala Asp Val Leu Gly Asp Phe 100 105 110			336
aac cat caa gca cta atg acc ttg gta ttc ccg ggg tca tat ggg gtt Asn His Gln Ala Leu Met Thr Leu Val Phe Pro Gly Ser Tyr Gly Val 115 120 125			384
gca tct caa gca gcc tca cca ttc ctt gct ccc ctc cct gtg aac cta Ala Ser Gln Ala Ala Ser Pro Phe Leu Ala Pro Leu Pro Val Asn Leu 130 135 140			432
tct gtg att gac ctt ccc tca acg tcg agc cct tta acc gcc tat tcg Ser Val Ile Asp Leu Pro Ser Thr Ser Ser Pro Leu Thr Ala Tyr Ser 145 150 155 160			480
aaa gat aaa gtt ttc gcc ttc tct gtg gaa tac agc agc gcg ccg gaa Lys Asp Lys Val Phe Ala Phe Ser Val Glu Tyr Ser Ser Ala Pro Glu 165 170 175			528
ctc gtg gct gct gtt caa gaa atc ccc aac aac agt gcc gac ctg aaa Leu Val Ala Ala Val Gln Glu Ile Pro Asn Asn Ser Ala Asp Leu Lys 180 185 190			576
ttg cag gag acg caa ttg atc gag atg gaa cgc cag atg tgg atc atg Leu Gln Glu Thr Gln Leu Ile Glu Met Glu Arg Gln Met Trp Ile Met 195 200 205			624
aag gct gcc agg gct cac aca aaa cgc agc ctt gct caa tgg gtg cac Lys Ala Ala Arg Ala His Thr Lys Arg Ser Leu Ala Gln Trp Val His 210 215 220			672
gat acc tgg aca gag tct ctt gat ctt atc aag agc gct caa acg ctc Asp Thr Trp Thr Glu Ser Leu Asp Leu Ile Lys Ser Ala Gln Thr Leu 225 230 235 240			720
gac gtg gtt gtc atg gtg cta ggt tat ata tca atg cac ttg act ttc Asp Val Val Val Met Val Leu Gly Tyr Ile Ser Met His Leu Thr Phe 245 250 255			768
gtc tca ctc ttc ctc agc atg aaa aaa ttg gga tcg aag gtt tgg ctg Val Ser Leu Phe Leu Ser Met Lys Lys Leu Gly Ser Lys Val Trp Leu 260 265 270			816
gct aca agc gtc ctt ttg tcg tca aca ttt gcc ttt ctc ctc ggt ctc Ala Thr Ser Val Leu Leu Ser Ser Thr Phe Ala Phe Leu Leu Gly Leu 275 280 285			864
gac gtg gcc ata aga cta ggg gtt ccg atg agc atg agg ttg cta tcc Asp Val Ala Ile Arg Leu Gly Val Pro Met Ser Met Arg Leu Leu Ser 290 295 300			912
gaa ggc ctc ccc ttc ttg gtg gtg atc gtt ggc ttt gag aag agc atc Glu Gly Leu Pro Phe Leu Val Val Ile Val Gly Phe Glu Lys Ser Ile 305 310 315 320			960
act ctg acc agg gct gtt ttg tcc tat gct gtg cag cac cga aag ccc Thr Leu Thr Arg Ala Val Leu Ser Tyr Ala Val Gln His Arg Lys Pro 325 330 335			1008

cag	aag	ata	cag	tct	gac	cag	ggt	agc	gtg	aca	gcc	att	gct	gaa	agt	1056
Gln	Lys	Ile	Gln	Ser	Asp	Gln	Gly	Ser	Val	Thr	Ala	Ile	Ala	Glu	Ser	
		340						345					350			
acc	atc	aat	tac	gcc	gta	cga	agc	gcc	att	cgg	gag	aag	ggt	tac	aat	1104
Thr	Ile	Asn	Tyr	Ala	Val	Arg	Ser	Ala	Ile	Arg	Glu	Lys	Gly	Tyr	Asn	
		355					360					365				
atc	gtg	tgc	cac	tac	gtg	gtc	gag	atc	ctg	ctc	cta	gtt	atc	ggt	gct	1152
Ile	Val	Cys	His	Tyr	Val	Val	Glu	Ile	Leu	Leu	Leu	Val	Ile	Gly	Ala	
	370					375					380					
gtc	tta	ggc	atc	caa	ggt	ggg	cta	cag	cac	ttc	tgt	gtt	cta	gct	gca	1200
Val	Leu	Gly	Ile	Gln	Gly	Gly	Leu	Gln	His	Phe	Cys	Val	Leu	Ala	Ala	
385					390					395					400	
ttg	atc	ctg	ttc	ttt	gac	tgt	ctg	ctg	ctg	ttt	aca	ttc	tac	act	gcg	1248
Leu	Ile	Leu	Phe	Phe	Asp	Cys	Leu	Leu	Leu	Phe	Thr	Phe	Tyr	Thr	Ala	
				405						410				415		
att	ctg	tct	atc	aag	ctc	gag	gta	aac	cgc	ctc	aaa	cgt	cat	atc	aac	1296
Ile	Leu	Ser	Ile	Lys	Leu	Glu	Val	Asn	Arg	Leu	Lys	Arg	His	Ile	Asn	
			420					425					430			
atg	cgg	tac	gcg	ttg	gaa	gat	gag	ggt	ctc	agt	cag	cgg	acg	gcg	gag	1344
Met	Arg	Tyr	Ala	Leu	Glu	Asp	Glu	Gly	Leu	Ser	Gln	Arg	Thr	Ala	Glu	
		435					440					445				
agt	gtc	gcg	acc	agc	aat	gat	gcc	caa	gac	agt	gca	cgt	aca	tat	ctg	1392
Ser	Val	Ala	Thr	Ser	Asn	Asp	Ala	Gln	Asp	Ser	Ala	Arg	Thr	Tyr	Leu	
	450					455					460					
ttt	ggc	aat	gat	atg	aaa	ggc	agc	agt	gtt	ccg	aag	ttc	aaa	ttc	tgg	1440
Phe	Gly	Asn	Asp	Met	Lys	Gly	Ser	Ser	Val	Pro	Lys	Phe	Lys	Phe	Trp	
465					470					475					480	
atg	gtc	gtt	ggt	ttc	ctt	atc	gtc	aac	ctc	gtc	aac	atc	ggc	tcc	acc	1488
Met	Val	Val	Gly	Phe	Leu	Ile	Val	Asn	Leu	Val	Asn	Ile	Gly	Ser	Thr	
				485					490					495		
ctt	ttc	caa	gcc	tct	tct	agt	gga	tcg	ttg	tcc	agt	ata	tca	tct	tgg	1536
Leu	Phe	Gln	Ala	Ser	Ser	Ser	Gly	Ser	Leu	Ser	Ser	Ile	Ser	Ser	Trp	
			500					505					510			
acc	gaa	agt	ctg	agc	gga	tcg	gcc	att	aaa	ccc	ccg	ctt	gag	ccc	ttc	1584
Thr	Glu	Ser	Leu	Ser	Gly	Ser	Ala	Ile	Lys	Pro	Pro	Leu	Glu	Pro	Phe	
		515					520					525				
aag	gta	gct	gga	agt	gga	cta	gat	gaa	cta	ctt	ttc	cag	gca	aga	ggg	1632
Lys	Val	Ala	Gly	Ser	Gly	Leu	Asp	Glu	Leu	Leu	Phe	Gln	Ala	Arg	Gly	
	530					535					540					
cgc	ggt	caa	tcg	act	atg	gtc	act	gtc	ctc	gcc	ccc	atc	aag	tac	gaa	1680
Arg	Gly	Gln	Ser	Thr	Met	Val	Thr	Val	Leu	Ala	Pro	Ile	Lys	Tyr	Glu	
545					550					555					560	
cta	gag	tat	cct	tcc	att	cac	cgt	ggt	acc	tcg	cag	cta	cac	gag	tat	1728
Leu	Glu	Tyr	Pro	Ser	Ile	His	Arg	Gly	Thr	Ser	Gln	Leu	His	Glu	Tyr	
				565					570					575		
gga	gtt	ggt	gga	aaa	atg	gtc	ggt	agc	ctg	ctc	acc	agc	ctg	gaa	gat	1776
Gly	Val	Gly	Gly	Lys	Met	Val	Gly	Ser	Leu	Leu	Thr	Ser	Leu	Glu	Asp	
			580					585					590			
ccc	gtc	ctc	tcc	aaa	tgg	gtg	ttt	gtg	gca	ctt	gcc	cta	agt	gtc	gct	1824
Pro	Val	Leu	Ser	Lys	Trp	Val	Phe	Val	Ala	Leu	Ala	Leu	Ser	Val	Ala	
			595				600					605				
ctg	aac	agc	tat	ctg	ttc	aag	gcc	gcc	aga	ctg	gga	atc	aaa	gat	cct	1872
Leu	Asn	Ser	Tyr	Leu	Phe	Lys	Ala	Ala	Arg	Leu	Gly	Ile	Lys	Asp	Pro	

610	615	620	
aat ctc ccg agt cac cca gtt gat cca gtt gag ctt gac cag gcc gaa Asn Leu Pro Ser His Pro Val Asp Pro Val Glu Leu Asp Gln Ala Glu 625 630 635 640			1920
agc ttc aac gct gcc cag aac cag acc cct cag att caa tca agt ctc Ser Phe Asn Ala Ala Gln Asn Gln Thr Pro Gln Ile Gln Ser Ser Leu 645 650 655			1968
caa gct cct cag acc aga gtg ttc act cct acc acc acc gac agt gac Gln Ala Pro Gln Thr Arg Val Phe Thr Pro Thr Thr Thr Asp Ser Asp 660 665 670			2016
agt gat gcc tca tta gtc tta att aaa gca tct cta aag gtc act aag Ser Asp Ala Ser Leu Val Leu Ile Lys Ala Ser Leu Lys Val Thr Lys 675 680 685			2064
cga gca gaa gga aag aca gcc act agt gaa ctt ccc gtg tct cgc aca Arg Ala Glu Gly Lys Thr Ala Thr Ser Glu Leu Pro Val Ser Arg Thr 690 695 700			2112
caa atc gaa ctg gac aat ttg ctg aag cag aac aca atc agc gag ttg Gln Ile Glu Leu Asp Asn Leu Leu Lys Gln Asn Thr Ile Ser Glu Leu 705 710 715 720			2160
aac gat gag gat gtc gtt gcc ttg tct ttg cgg gga aag gtt ccc ggg Asn Asp Glu Asp Val Val Ala Leu Ser Leu Arg Gly Lys Val Pro Gly 725 730 735			2208
tat gcc cta gag aag agt ctc aaa gac tgc act cgt gcc gtc aag gtt Tyr Ala Leu Glu Lys Ser Leu Lys Asp Cys Thr Arg Ala Val Lys Val 740 745 750			2256
cgc cgc tct atc att tcg agg aca ccg gct acc gca gag ctt aca agt Arg Arg Ser Ile Ile Ser Arg Thr Pro Ala Thr Ala Glu Leu Thr Ser 755 760 765			2304
atg ctg gag cac tcg aag ctg ccg tac gaa aac tac gcc tgg gaa cgc Met Leu Glu His Ser Lys Leu Pro Tyr Glu Asn Tyr Ala Trp Glu Arg 770 775 780			2352
gtg ctc ggt gca tgt tgc gag aac gtt att ggc tat atg cca gtc cct Val Leu Gly Ala Cys Cys Glu Asn Val Ile Gly Tyr Met Pro Val Pro 785 790 795 800			2400
gtt ggc gtc gcc ggt cct att gtt atc gac ggc aag agt tat ttc att Val Gly Val Ala Gly Pro Ile Val Ile Asp Gly Lys Ser Tyr Phe Ile 805 810 815			2448
cct atg gca acc acc gag ggc gtc ctc gtc gct agt gct agc cgt ggc Pro Met Ala Thr Thr Glu Gly Val Leu Val Ala Ser Ala Ser Arg Gly 820 825 830			2496
agt aag gca atc aac ctc ggt ggc ggt gcc gtg aca gtc ctg act ggc Ser Lys Ala Ile Asn Leu Gly Gly Ala Val Thr Val Leu Thr Gly 835 840 845			2544
gac ggt atg aca cga ggc ccg tgt gtg aag ttt gat gtc ctt gaa cga Asp Gly Met Thr Arg Gly Pro Cys Val Lys Phe Asp Val Leu Glu Arg 850 855 860			2592
gct ggt gct gct aag atc tgg ctc gat tcg gac gtc ggc cag acc gta Ala Gly Ala Ala Lys Ile Trp Leu Asp Ser Asp Val Gly Gln Thr Val 865 870 875 880			2640
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Met Arg Thr Thr Ile Ala Gly Thr His Leu Tyr Ile Arg Phe Lys Thr	
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act act ggc gac gct atg gga atg aat atg att tct aag ggc gtg gag	2784
Thr Thr Gly Asp Ala Met Gly Met Asn Met Ile Ser Lys Gly Val Glu	
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His Ala Leu Asn Val Met Ala Thr Glu Ala Gly Phe Ser Asp Met Asn	
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att att acc cta tca gga aat tac tgt acg gat aag aaa cct tca gct	2880
Ile Ile Thr Leu Ser Gly Asn Tyr Cys Thr Asp Lys Lys Pro Ser Ala	
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Leu Asn Trp Ile Asp Gly Arg Gly Lys Gly Ile Val Ala Glu Ala Ile	
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ata ccg gcg aac gtt gtc agg gat gtc tta aag agc gat gtg gat agc	2976
Ile Pro Ala Asn Val Val Arg Asp Val Leu Lys Ser Asp Val Asp Ser	
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Met Val Gln Leu Asn Ile Ser Lys Asn Leu Ile Gly Ser Ala Met Ala	
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Gly Ser Val Gly Gly Phe Asn Ala Gln Ala Ala Asn Leu Ala Ala	
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Asp Ser Phe Phe His Gly Pro Ala Asn Val Asp Lys Ala Glu Trp Gly  
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Trp Lys Trp Gln Ser Phe Asp Gly Asp Ala Asp Val Leu Gly Asp Phe  
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Asn His Gln Ala Leu Met Thr Leu Val Phe Pro Gly Ser Tyr Gly Val  
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Lys Asp Lys Val Phe Ala Phe Ser Val Glu Tyr Ser Ser Ala Pro Glu  
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 Pro Val Leu Ser Lys Trp Val Phe Val Ala Leu Ala Leu Ser Val Ala  
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 Ser Phe Asn Ala Ala Gln Asn Gln Thr Pro Gln Ile Gln Ser Ser Leu  
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Asp Gly Met Thr Arg Gly Pro Cys Val Lys Phe Asp Val Leu Glu Arg  
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